Solicitation Document

SUPPLY AND DELIVERY OF 1500 KW DC TRACTION POWER SUBSTATIONS

Contract #163011

RFP NUMBER: 00-034

July 2000

This Contract will be funded in part by the Federal Transit Administration (FTA).
Neither FTA nor the Federal Government are party to any subagreement nor to any solicitations or request for proposals.

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20___, by and between King County, Washington, (hereinafter "County") _____ (hereinafter "Contractor").

WITNESSETH:

WHEREAS, the County has caused contract documents for:

Contract No.: 163011

Contract Title: SUPPLY AND DELVIERY OF 1500 KW DC TRACTION POWER SUBSTATIONS

to be prepared for certain work as described therein; and

WHEREAS, the Contractor has assured the County that it has the specialized expertise and experience necessary to properly provide the goods and services in a timely manner and that its Proposal includes all of the functions and features required for the goods and services; and

WHEREAS, the County has accepted the Contractor's offer to provide the goods and services in accordance with the Contract's terms, specifications and Proposal documents;

WHEREAS, by executing this Agreement, the Contractor represents that the waiver of the Contractor's immunity under industrial insurance, Title 51 RCW, as set forth in the contract documents was mutually negotiated by the parties;

NOW THEREFORE, in consideration of the mutual covenants and agreements of the parties herein contained and to be performed, the Contractor hereby agrees to supply the goods and services at the price and on the terms and conditions herein contained, and to assume and perform all of the covenants and conditions herein required of the Contractor, and the County agrees to pay the Contractor the contract price provided herein for the supply of the goods and services and the performance of the covenants set forth herein.

THE FURTHER TERMS, CONDITIONS AND COVENANTS of the contract are set forth in the following exhibit parts each of which is attached hereto and by this reference made a part hereof in the following order of precedence; Change Orders; the Contract Document which includes: Standard Contractual Terms and Conditions, Specific Contractual Terms and Conditions, Insurance Requirements, Federal Transit Administration (FTA) Requirements, Specifications, Contract Administration, Introduction, Attachments **A)** Proposal response Form, **B)** Price Proposal, **C)** Performance and Payment Bond, **D)** Personnel Inventory Report, **E)** Affidavit and Certificate of Compliance, **F)** Sworn Statement Regarding Disadvantaged Business Enterprise Commitment, **G)** Current or Former King County Employee Disclosure Form, **H-1)** Buy America Certificate, **I)** Certificate of Lobbying Activities, **J)** Disclosure Form to Report Lobbying and Instructions, **K)** Certification Regarding Debarment, Suspension and Other Responsibility Matters – Primary Covered Transactions, **L)** Certification Regarding Debarment, Suspension and Other Ineligibility and Voluntary Exclusion – Lower-Tier Covered Transactions, RFP Addenda; Request for Proposals; Best and Final Offer; and the Proposal.

COMPANY NAME:

_____

ACCEPTED BY:

_____
Authorized Signature

_____
Name and Title (Print or Type)

Date Accepted: _____

KING COUNTY

APPROVED BY:

_____
Signature

_____
Name and Title (Print or Type)

Date Accepted: _____

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DEFINITION OF WORDS AND TERMS

Words and terms shall be given their ordinary and usual meanings. Where used in the contract documents, the following words and terms shall have the meanings indicated. The meanings shall be applicable to the singular, plural, masculine, feminine and neuter of the words and terms.

Acceptance: Formal action of the County in determining that the Contractor's work has been completed in accordance with the contract.

Act of Nature: A cataclysmic phenomenon of nature, such as an earthquake, flood or cyclone.

Addenda: Written additions, deletions, clarification, interpretations, modifications or corrections to the contract documents issued by the County during the Proposal period and prior to the date and time established for submittal of Proposals.

Best and Final Offer: Best and Final Offer shall consist of the Proposer's revised Proposal, the supplemental information and the Proposer's Best and Final Offer. In the event of any conflict or inconsistency in the items submitted by the Proposer, the items submitted last will govern.

Buyer: Individual designated by King County to conduct the contract solicitation process, draft and negotiate contracts, resolve contractual issues and support the Project Manager during contract performance.

Change Order: Written order issued by the County, with or without notice to sureties, making changes in the work within the scope of this contract.

Contract or Contract Documents: The writings and drawings embodying the legally binding obligations between the County and the Contractor for completion of the services or work under the Contract.

Contract Administrator: The individual designated by the County to administer the contract and be the contractor’s primary point of contact. The contract administrator will approve orders, receipts, invoices and document the contractor’s performance. This person may be the project manager.

Contract Price: Amount payable to the Contractor under the terms and conditions of the contract for the satisfactory performance of the services under the contract.

Contract Period: The period and time during which the Contractor shall perform the services or work under the contract.

Contract Time: Number of calendar days and/or the intermediate and final completion dates stated in the contract documents for the completion of the work specified herein.

Contractor: The individual, association, partnership, firm, company, corporation, or combination thereof, including joint venturers, contracting with the County for the performance of services or work under the contract.

Contractor's Representative: The individual designated in writing by the Contractor to act on its behalf under this contract.

Cost Analysis: The review and evaluation of the separate cost elements and proposed profit of the Vendor’s cost or pricing data. Cost analysis is the application of judgment utilizing criteria to project

from the data to the estimated costs in order to form an opinion on the degree to which the proposed costs represent what the contract should cost, assuming reasonable economy and efficiency.

Criteria, Evaluation Criteria or Evaluation Factors: The elements cited in the RFP that the County will examine to determine the proposers understanding of the requirements; technical, business and management approach; key personnel; qualification and experience of the proposer; potential for successfully accomplishing the contract; risk allocation and the probable cost to the County.

Day: Calendar day.

Documentation: Technical publications relating to the use of the Software, such as reference, user, installation, systems administration and technical guides, delivered by the Contractor to King County.

Enhancement: Technical or functional additions to the Software to improve software functionality and/or operations. Enhancements are delivered with new releases of the Software.

Error: An unanticipated software problem resulting in program behavior not following the software's logical design and/or Contractor's documentation.

Executive: King County Executive

Final Acceptance: The point when King County acknowledges that the Contractor's software works according to the Contract.

Fix: The repair or replacement of source or object or executable code versions of the Software to remedy an Error.

Functionality: The configuration as specified in the contract documents; i.e., software, software updates, hardware and services shall operate together efficiently.

Month: The period commencing on the first day of a calendar month and ending on the first day of the next succeeding calendar month.

Performance Benchmark: Any structured test, capable of repetition, the results of which purport to measure response time, load capacity, throughput speed, or other elements of Software and Hardware responsiveness. A Performance Benchmark does not include any broad statements regarding use, such as a statement regarding how many records are being processed per month.

Person: Includes individuals, associations, firms, companies, corporations, partnerships, and joint ventures.

Previous Sequential Release: A release of Software for use in a particular operating environment which has been replaced by a subsequent release of the Software in the same operating environment. A Previous Sequential Release will be supported by Contractor. Multiple Previous Sequential Releases may be supported at any given time.

Price Analysis: The process of examining and evaluating a proposed price without evaluating its separate cost elements and proposed profit.

Project Manager: The individual designated by the County to manage the project on a daily basis and who may represent the County for contract administration. This contract may be part of a larger County project.

Proposal Evaluation Team (PET): Team of people appointed by the County to evaluate the Proposals, conduct discussions, call for Best and Final Offers, score the Proposals and make recommendations.

Proposed Work Change (PWC): A written document issued by the project manager, or his/her designee, to the Proposer identifying contemplated changes in the work and requesting a price estimate from the Contractor; such a document shall not be interpreted or construed to constitute a change order.
Proposer: Individual, association, partnership, firm, company, corporation, or a combination thereof, including joint ventures, submitting a Proposal to perform the work.

Proposer's Representative: The individual designated in writing by the Proposer to act on its behalf under this contract.

Provide: Furnish without additional charge.

RCW: The Revised Code of Washington.

RFP: Request for Proposals. Also known as the solicitation document.

Reference Documents: Reports, specifications, and drawings which are available to Proposers for information and reference in preparing Proposals but not as part of this contract.

Services: The furnishing of labor, time or effort by a Contractor, not involving the delivery of any specific end product. Work performed to meet a demand, especially work not connected with a manufacturing process.

Shall or Will: Whenever used to stipulate anything, shall or will means mandatory by either the Contractor or the County, as applicable, and means that the Contractor or the County, as applicable, has thereby entered into a covenant with the other party to do or perform the same.

Software: All or any portion of the then commercially available version(s) of the binary computer software programs and enhancements thereto, including source code, localized versions of the binary computer software programs and enhancements thereto, including source code and Documentation delivered by Contractor to King county.

Software Extensions: A modification to the standard panels, screens, workflow processing that are made by King County without changes to the source code.

Specifications or Technical Specifications: A Section of the Request for Proposals consisting of written descriptions of services to be performed or of the technical requirements to be fulfilled under this contract.

Subcontractor: The individual, association, partnership, firm, company, corporation, or joint venture entering into an agreement with the Contractor to perform any portion of the work covered by this contract.

Submittals: Information which is submitted to the project manager in accordance with the technical specifications.

Subsection: For reference or citation purposes, subsection shall refer to the paragraph, or paragraphs, called out by part, section and alphanumeric designator

System Integration: The installations and operations of all hardware, software and communications components so that they function as an operational environment and in conjunction with each other.

Update: All published revisions to the Documentation and one (1) copy of the new release of the software which are not designated by Contractor as new products.

User Defined Field: A flexible data field for use as desired in an actual implementation. This field is used where the software database and forms do not contain the data element required by business needs. The field can be either a single field or a set of segments.

Virus: Software code that is intentionally and specifically constructed for the purpose of destroying, interrupting or otherwise adversely impacting other code or data in a computer, such as replicating itself or another program many times without any useful purpose.

Work: Everything to be done and provided for the fulfillment of the contract.

Workaround: A change in the procedures followed or data supplied to avoid an error without significantly impairing performance of the Software.

Year 2000 Compliant: An information system is "Year 2000 Compliant" when the system is able to accurately process date data-including, but not limited to, calculating, comparing and sequencing--from, into and between the twentieth and twenty-first centuries, including leap year calculations.

KING COUNTY

REQUEST FOR PROPOSALS AD PAGE

RFP NO. 00-034

Proposal Submittal Date: August 31, 2000

Proposals for the Supply and Delivery of 1500 KW DC Traction Power Substations will be received by King County, at its Procurement & Contract Services Division, Exchange Building, (M/S EXC-FI-0871), 8th Floor, 821 Second Avenue, Suite 10, Seattle, Washington 98104-1598 until 2:00 p.m. Seattle time on August 31, 2000. **Proposals submitted or arriving after 2:00 p.m. will not be accepted.**

Information may be obtained by contacting the undersigned at phone number (206) 684-2012 or FAX number (206) 684-1470, or in person at the above address.

The County reserves the right to reject any and all Proposals submitted or parts thereof, and to waive informalities or minor irregularities.

This information is available on request in accessible formats for people with disabilities by calling (206) 684-2046 or (206) 689-3413 (TDD).

King County

John Gonsalez
Buyer

Phone No.: (206) 684-2012
Fax No.: (206) 684-1470
E-mail address: john.gonsalez@metrokc.gov

Cost Center No: 5310
Project Number: 432374
Phase: 4, SubProject: 50
Grant: 416

Date of Publication: July 27, 2000

This RFP is available on the Internet at www.metrokc.gov/finance/procure/exch/html/exch.htm or by using the first part www.metrokc.gov/finance/procure and choosing "Procurement Information System…" on the next page choose "Exchange Building" and on the last page look for 00-034. Persons who copy the Document from the Internet must inform the Buyer that they have received the document. If they fail to inform the Buyer, they will not be notified of Addendums as issued. All Addendums must be referenced in the Proposal Response Form.

INTRODUCTION

TITLE

RFP # 00-034

PART A: SECTION 1 - PROPOSAL PREPARATION

1-1 Introduction

King County Metro Transit currently operates a 155 electric bus system with approximately 70 Miles of two-way wire and 29 rectifier substations. Critical to those operations is the Central Substation located in the heart of the Central Business District in presently leased space. This Equipment, although in good condition and recently renovated, is approaching the end of its useful Life cycle. The lease on the space occupied by this substation expires in year 2003 and the present Owners of the property have no interest in the renewal of the lease.

In order to maintain trolley operations, King County Metro has decided to buy new replacement Equipment for the Central Substation and site it on property newly acquired, on a lease basis, from The Washington State Department of Transportation. The necessary equipment will be acquired through the contract resulting from this procurement.

The work under the resultant contract comprises the furnishing and delivery of two 1500 KW new, self-contained, package unit traction power substations, packaged in a single enclosure, complete from the standpoint of receiving utility power to the connection of positive and negative feeder cables. The responsibility of the Contractor shall include the supply, factory testing, delivery of equipment on site, supervision of installation, post installation testing, and training of King County Metro's maintenance personnel. Preparation of the site and connection of outside cabling will be performed by others.

1-2 Proposal Submission

Proposals shall contain all required attachments and information, be sealed and submitted to King County (hereinafter "County"), Procurement & Contract Services Division, Exchange Building, (M/S EXC-FI-0871), 8th Floor, 821 Second Avenue, Suite 10, Seattle, Washington 98104-1598 no later than 2:00 P.M. Seattle time on August 31, 2000.

The County reserves the right to request oral interviews, additional information, site visits, or any other type of clarification of Proposal information it deems necessary to evaluate Proposals

1-3 Proposal Signature

Each Proposal shall be signed by the Proposer or the Proposer's authorized representative and include the Proposer's address. If the Proposal is made by an individual, the name, signature and post office address must be shown; if made by a partnership or joint venture, the name and post office address of the partnership or joint venture and the signature of at least one of the general partners or authorized joint venture partners must be shown; if made by a corporation, the name of the state under the laws of which the corporation is chartered, the name and post office address of the corporation and the title of the person who signs on behalf of the corporation must be shown.

1-4 Addenda

Each Proposal Response Form, Attachment A, shall include acknowledgment of receipt and review of all addenda issued during the Proposal period.

1-5 Schedule

	Day/Month/Year	Event
	July 27, 2000	Public announcement of Request for Proposals
	August 10, 2000	Pre-proposal questions due, in writing
	August 15, 2000, 1:00-3:30 P.M.	Pre-proposal conference (time and location) King Street Center, 201 S. Jackson St., Seattle, WA. 98104-3856, Room 4D, attention Jim Murray, phone (206) 684-1388.
	August 21, 2000	Last questions due, **in writing**, per subsection 1-9
	August 31, 2000, 2:00 P.M.	Proposals due
	September 1, 2000	Evaluation/Negotiation of Proposals begins.
	September 18, 2000	During evaluations/negotiations, firms with Proposals judged unacceptable will be notified that they will not be considered further.
*	October 9, 2000	Evaluation/Negotiation complete
*	October 19, 2000	Execute contract and issue Notice to Proceed

*NOTE Dates preceded by an asterisk are estimated dates. Estimated dates are for information only. The process will be accelerated where possible.

1-6 Inquiries

Inquiries concerning the procurement process shall be directed to John Gonsalez, Buyer, e-mail address: john.gonsalez@metrokc.gov/ or at phone number (206) 684-2012 or FAX number (206) 684-1470 or in writing to the County's Procurement & Contract Services Division, M.S. EXC-FI-0871, Exchange Building, 8th Floor, 821 Second Avenue, Suite 10, Seattle, Washington 98104-1598.

Communications with other than the listed County staff may cause the firm to be subject to disqualification by the Manager of Procurement Services or designee.

1-7 Preproposal Conference

A preproposal conference will be held August 15, 2000, at 1:00 P.M., King Street Center, 201 S. Jackson St., Seattle, WA, 98104-3856, Room 4D, attention Jim Murray, phone (206) 684-1388. All prospective proposers are strongly encouraged to attend. Prospective proposers should submit written questions to the buyer no later than August 10, 2000. Copies of questions with answers along with responses from the preproposal conference will be sent to everyone who received an RFP.

1-8 Letter of Intent (Not Used)

1-9 Interpretation of Proposal and Contract Documents

No oral interpretations as to the meaning of the RFP will be made to any Proposer. Requests for a written interpretation shall be made in writing and delivered or faxed to the Buyer at the County's Procurement Services Division at the address indicated in Section 1-6 at least ten (10) calendar days before the date established for submitting Proposals. Any interpretation deemed necessary by the County will be in the form of an addendum to the RFP and when issued will be delivered as promptly as is practicable to all parties to whom the RFP has been issued. All addenda shall become part of the RFP and any subsequently

awarded contract. Proposers shall not rely upon any oral statements or conversations, whether at the pre-proposal conference, if any, or otherwise, they may have with County employees or third parties regarding the RFP.

1-10 Instructions for Preparation of Proposals

Figures and tables must be numbered and referenced in the text or inserted in the back of the document as an appendix. Pages must be numbered consecutively within each of the proposal sections showing section number and page number. One copy shall be unbound to facilitate reproduction.

Proposals are to be submitted in two sections:

Section One: Proposal Requirements

This section shall contain the responses to the proposal requirements as described and referenced in Section 7 of the RFP. Vendor responses to Section 7 shall be limited to three pages per question.

Section Two: Proposal Cost/Price Schedule

The proposal Cost/Price Schedule, Attachment B and Attachment B1, shall be compiled and contain all costs necessary for a DC Traction Power Substation per RFP #00-034

1-11 Examination of Proposal and Contract Documents

The submission of a Proposal shall constitute an acknowledgment upon which the County may rely that the Proposer has thoroughly examined and is familiar with the RFP, including any work site identified in the RFP, and has reviewed and inspected all applicable statutes, regulations, ordinances and resolutions addressing or relating to the goods and services to be provided hereunder. The failure or neglect of a Proposer to receive or examine such documents, work sites, statutes, regulations, ordinances or resolutions shall in no way relieve the Proposer from any obligations with respect to the Proposer's Proposal or to any contract awarded pursuant to this RFP. No claim for additional compensation will be allowed which is based upon a lack of knowledge or misunderstanding of this RFP, work sites, statutes, regulations, ordinances or resolutions.

1-12 Cost of Proposals

The County is not liable for any costs incurred by Proposers in the preparation, presentation, testing or negotiation of proposals submitted in response to this RFP.

1-13 Modification or Withdrawal of Proposals Prior to Submittal Date

At any time before the time and date set for submittal of Proposals, a Proposer may request to withdraw or modify its Proposal. Such a request must be made in writing by a person with authority as identified in Attachment A, Proposal Response Form. All Proposal modifications shall be made in writing, executed and submitted in the same form and manner as the original Proposal.

1-14 Errors and Administrative Corrections

The County will not be responsible for any errors in Proposals. Proposers will only be allowed to alter Proposals after the submittal deadline in response to requests for clarifications or Best and Final Offers by the County. The County reserves the right to request an extension of the Proposal period from a Proposer or Proposers.

The County reserves the right to allow corrections or amendments to be made that are due to minor administrative errors or irregularities, such as errors in typing, transposition or similar administrative errors.

1-15 Prompt Payment Discount

Proposals offering a prompt-payment discount for payments made within twenty (20) calendar days will be evaluated at the discounted price.

1-16 Postponement or Cancellation of Request for Proposal

The County reserves the right to cancel the RFP or postpone the date and time for submitting Proposals.

1-17 Compliance with RFP Terms and Attachments

King County intends to award a contract based on the terms, conditions and attachments contained in this RFP. Proposers are strongly advised to not take any exceptions. Proposers shall submit Proposals that respond to the requirements of the RFP. An exception is not a response to a Proposal requirement. If an exception is taken, a Notice of Exception must be submitted with the Proposal. The Notice of Exception must identify the specific point or points of exception and provide an alternative.

Proposers are cautioned that exceptions to the terms, conditions and attachments may result in rejection of the Proposal.

The County may, at its sole discretion, determine that a Proposal with a Notice of Exception merits evaluation. A Proposal with a Notice of Exception not immediately rejected may be evaluated, but its competitive scoring will be reduced to reflect the importance of the exception. Evaluation and negotiation will only continue with the Proposer if the County determines that a contract in the best interest of the County may be achieved.

1-18 Proposal Requirements

A. The Proposal shall contain the following items and follow the exact sequence outlined below:

1. Executive Summary or Overview of Proposal (optional).

2. Statement accepting the terms and attachments contained in the RFP.

3. Agreement: Sign and submit with proposal.

4. Attachments:

. Attachment A - Proposal Response Form
Attachment B - Price Proposal
Attachment D - Personnel Inventory Report
Attachment E - Affidavit and Certificate of Compliance
Attachment F - Sworn Statement Regarding Disadvantaged Business Enterprise Commitment - Sign and submit with Proposal
Attachment G - Current or Former King County Employee Disclosure Form. If applicable, complete and submit as part of the Proposal.
Attachment H-1 Buy America Certificate for Rolling Stock or Associated Equipment
Attachment I - Certificate of Lobbying Activities - Sign and submit with Proposal
Attachment J - Disclosure Form to Report Lobbying and Instructions - Complete as appropriate, sign and submit with Proposal

Attachment K - Certification Regarding Debarment, Suspension and Other Responsibility Matters - Primary Covered Transactions. Signed by Contractor after award

Attachment L - Certification Regarding Debarment, Suspension, and Other Ineligibility and Voluntary Exclusion - Lower-Tier Covered Transactions. Signed by subcontractors after award to the Primary Contractor

Attachment M- King County Contractor Disclosure Form - Complete, sign and submit to buyer when requested prior to award.

Attachment N - ADA/504 Assurance of Compliance-Not Used

Attachment O Statement of Compliance – Complete/submit with Proposal-Not Used

Attachment P Certification of Acceptance of Terms and Conditions-Not Used

B. Submit Seven (7) copies of the Proposal and attachments. One copy shall be unbound to facilitate reproduction.

1-19 Collusion

If the County determines that collusion has occurred among Proposers, none of the Proposals of the participants in such collusion will be considered. The County's determination shall be final.

1-20 Rejection of Proposals

A. The County reserves the right to reject any Proposal for any reason including, but not limited to, the following: any Proposal which is incomplete, obscure, irregular or lacking necessary detail and specificity; any Proposal which has any qualification, addition, limitation or provision attached to the Proposal; any Proposal from Proposers who (in the sole judgment of the County) lack the qualifications or responsibility necessary to perform the work; any Proposal which is not approved as being compliant with the requirements for equal employment opportunity; any Proposal for which a Proposer fails or neglects to complete and submit any qualifications information within the time specified by the County; and any Proposal submitted by a Proposer which is not registered or licensed as may be required by the laws of the state of Washington or local government agencies.

B. In consideration for the County's review and evaluation of its Proposal, the Proposer waives and releases any claims against the County arising from any rejection of any or all Proposals, including any claim for costs incurred by Proposers in the preparation and presentation of Proposals submitted in response to this RFP.

1-21 Proposal Price and Effective Date

The Proposal price shall include everything necessary for the prosecution and completion of the contract including but not limited to furnishing all materials, equipment, supplies, tools, plant and other facilities and all management, supervision, labor and service, except as may be provided otherwise in this RFP. Prices quoted on the Proposal Response Form shall include all freight charges, FOB to the designated delivery point. Washington State sales/use taxes and Federal excise taxes shall not be included in the Proposal price. The County will pay any Washington State sales/use taxes applicable to the contract price or tender an appropriate amount to the Contractor for payment to Washington State. The County is exempt from Federal excise taxes. All other government taxes, duties, fees, royalties, assessments and charges shall be included in the Proposal price. The Proposal shall remain in effect for ninety (90) calendar days after final Proposal submittal date and time. In the event of a discrepancy between the unit price and the extended amount for a Proposal item, the County reserves the right to clarify the Proposal.

1-22 Procedure When Only One Proposal is Received

If the County receives a single responsive, responsible and advantageous Proposal, the County shall have the right, in its sole discretion, to extend the Proposal acceptance period for an additional sixty (60) days and to conduct a price or cost analysis on such Proposal. The Proposer shall promptly provide all cost or pricing data, documentation and explanation requested by the County to assist in such analysis. By conducting such analysis, the County shall not be obligated to accept the single Proposal; the County reserves the right to reject such Proposal or any portion thereof.

1-23 Protest Procedures

A. Form of Protest: In order to be considered, a Protest shall be in writing, addressed to the Manager of the King County Procurement and Contract Services Division of the Department of Finance, and include:

1. The name, address, and phone number of the Bidder or Proposer protesting, or the authorized representative of the Bidder or Proposer;

2. The Invitation For Bid or Invitation To Bid ("IFB" or "ITB") or Request for Proposals ("RFP") Number and Title under which the Protest is submitted;

3. A detailed description of the specific grounds for protest and any supporting documentation. It is the responsibility of the Protesting Bidder/Proposer to supplement its Protest with any subsequently discovered documents prior to the Manager's decision;

4. The specific ruling or relief requested; and

5. Evidence that all persons with a financial interest in the procurement have been given notice of the Protest or if such persons are unknown, a statement to that effect.

B. Who May Protest.

1. Protests based on specifications. Any prospective Bidder/Proposer.

2. Protests following Bid submittal. Any Bidder or Proposer submitting a response to an IFB or ITB or RFP showing a substantial financial interest in the solicitation or award of any Contract.

C. Time to Protest. Protests based on specifications or other terms in the RFP, ITB, or IFB document which are apparent on the face of said document must be received by the County no later than ten calendar days prior to the date established for submittal of Bids/Proposals. Protests based on other circumstances must be received by the County within five calendar days after the protesting Bidder/Proposer knows or should have known of the facts and circumstances upon which the Protest is based. In no event shall a Protest be considered if all bids are rejected or after award of the Contract.

D. Determination of Protest. Upon receipt of a timely written Protest, the Procurement Manager shall investigate the Protest and shall respond in writing to the Protest prior to the award of contract. Except as provided below, the decision of the Procurement Manager shall be final.

E. Reconsideration of Manager's Decision. A financially interested Bidder or Contractor may request that a Manager's adverse decision be reviewed by the Director of the King County Department of Finance ("Director") on a reconsideration basis only. The only justifications for reconsideration are (1) new data, relevant to the underlying grounds for protest and unavailable

at the time of the Protest to the Manager; or (2) the Manager made an error of law or regulation. The following procedures shall be followed for a reconsideration of the Manager's decision:

1. Form of Request for Reconsideration. In order to be considered, a Request for Reconsideration must be filed with the Director in writing and include:

   i. Name, address, and telephone number of the person protesting or their authorized representative;

   ii. A copy of the written decision of the Manager; and

   iii. Justification for a reconsideration by the Director, including all pertinent facts and law on which the Bidder or Proposer is relying.

2. Time for filing Request for Reconsideration. The financially interested Bidder or Proposer must file the Request for Reconsideration no later than five calendar days of receiving the Procurement Manager's decision.

3. Review of Manager's Decision. Upon receipt of a Request for Reconsideration, the Director or his/her designee shall review (1) the information submitted to and reviewed by the Manager and (2) the decision of the Manager, and shall thereafter issue a final determination regarding the Request for Reconsideration. No other information will be reviewed unless the basis for the request for reconsideration is new data.

F. Failure To Comply: Failure to comply with the procedures set forth herein may render a Protest untimely or inadequate and may result in rejection thereof by the County.

1-24 Conflicts of Interest - Current and Former Employees

The County seeks to eliminate and avoid actual or perceived conflicts of interest and unethical conduct by current and former County employees in transactions with the County. Consistent with this policy, no current or former County employee may contract with, influence, advocate, advise, or consult with a third party about a County transaction, or assist with the preparation of Proposals submitted to the County while employed by the County or within one (1) year after leaving the County's employment, if he/she was substantially involved in determining the work to be done or process to be followed while a County employee.

All bidders, proposers, vendors or contractors who anticipate contracting with the County must identify at the time of offer, such current or former County employees involved in preparation of bids/proposals or the anticipated performance of the work or services if awarded the contract. This information should be included in Attachment G - "Current or Former County Employee Disclosure Form." Failure to identify former County employees involved in this transaction may result in the County's denying or terminating this contract. In addition, after award, the Contractor is responsible for notifying the County's project manager of current or former County employees who may become involved in the contract any time during the term of the contract

1-25 Non-Discrimination and Affirmative Action

PART 1: NON-DISCRIMINATION AND AFFIRMATIVE ACTION

A. King County Code Chapters 12.16 and 12.18 are incorporated by reference as if fully set forth herein and such requirements apply to this Contract; provided however, that no specific levels of utilization of minorities and women in the workforce of the Contractor shall be required, and the Contractor is not required to grant any preferential treatment on the basis of race, sex, color, ethnicity or national origin in

its employment practices; and provided further that, notwithstanding the foregoing, any affirmative action requirements set forth in any federal regulations, statutes or rules included or referenced in the contract documents shall continue to apply.

B. During the performance of this Contract, neither the Contractor nor any party subcontracting under the authority of this Contract shall discriminate nor tolerate harassment on the basis of race, color, sex, religion, nationality, creed, marital status, sexual orientation, age, or the presence of any sensory, mental, or physical disability in the employment or application for employment or in the administration or delivery of services or any other benefits under this Contract.

C. The Contractor will, prior to the commencement of the work and during the term of this Contract, furnish the County, upon request and on such forms as may be provided by the County, a report of the affirmative action taken by the Contractor in implementing the terms of this section. The Contractor will permit access by the County to the Contractor's records of employment, employment advertisements, application forms, other pertinent data and records related to this Contract for the purpose of monitoring and investigation to determine compliance with these requirements.

D. The Contractor will implement and carry out the obligations contained in its Affidavit and Certificate of Compliance regarding equal employment opportunity. Failure to implement and carry out such obligations in good faith may be considered by the County as a material breach of this Contract and grounds for withholding payment and/or termination of the Contract and dismissal of the Contractor.

E. The Contractor shall comply fully with all applicable federal, state and local laws, ordinances, executive orders and regulations which prohibit such discrimination. These laws include, but are not limited to, RCW Chapter 49.60 and Titles VI and VII of the Civil Rights Act of 1964.

F. During the performance of this Contract, neither the Contractor nor any party subcontracting under the authority of this Contract shall engage in unfair employment practices. It is an unfair employment practice for any:

1. Employer or labor organization to discriminate against any person with respect to referral, hiring, tenure, promotion, terms, conditions, wages or other privileges of employment;

2. Employment agency or labor organization to discriminate against any person with respect to membership rights and privileges, admission to or participation in any guidance program, apprenticeship training program, or other occupational training program;

3. Employer, employment agency, or labor organization to print, circulate, or cause to be printed, published or circulated, any statement, advertisement, or publication relating to employment or membership, or to use any form of application therefor, which indicates any discrimination unless based upon a bona fide occupation qualification;

4. Employment agency to discriminate against any person with respect to any reference for employment or assignment to a particular job classification;

5. Employer, employment agency or a labor organization to retaliate against any person because this person has opposed any practice forbidden by KCC Chapter 12.18 or because that person has made a charge, testified or assisted in any manner in any

investigation, proceeding or hearing initiated under the provisions of KCC Chapter 12.18;

6. Publisher, firm, corporation, organization or association printing, publishing or circulating any newspaper, magazine or other written publication to print or cause to be printed or circulated any advertisement with knowledge that the same is in violation of KCC Chapter 12.18.030.C., or to segregate and separately designate advertisements as applying only to men and women unless such discrimination is reasonably necessary to the normal operation of the particular business, enterprise or employment, unless based upon a bona fide occupational qualification; and/or

7. Employer to prohibit any person from speaking in a language other than English in the workplace unless:

   a. The employer can show that requiring that employees speak English at certain *times* is justified by business necessity, and

   b. The employer informs employees of the requirement and the consequences of violating the rule.

PART 2: REQUIRED SUBMITTALS

A. All Contractors entering into a contract or agreement with King County valued at $25,000 or more under this Request for Proposals shall, after the proposer receives written notice of selection, submit the following:

   1) A Personnel Inventory Report on the form provided by the County.

   2) An Affidavit of Compliance demonstrating the Contractor's commitment to comply with the provisions of KCC Chapter 12.16.

B. The County will not execute any agreement or contract without prior receipt of fully executed forms listed in subparagraph A above.

C. Assistance with the requirements of this Section and copies of Chapters 12.16 and 12.18 are available from the Minority and Women's Business Enterprise and Contract Compliance Division, phone (206) 684-1330.

PART 3: NONDISCRIMINATION IN SUBCONTRACTING PRACTICES

A. Compliance with Initiative 200 In accordance with the provisions of Washington Initiative 200, no County Minority and Women Business (M/WBE) utilization requirements shall apply to this Contract. No minimum level of M/WBE subcontractor participation or purchase from M/WBE certified vendors is required and no preference will be given by the County to a bidder or proposer for their M/WBE utilization or M/WBE status. Provided, however, that any affirmative action requirements set forth in any federal regulations or statutes included or referenced in the Contract documents will continue to apply.

B. Non-Discrimination During the term of this Contract, the Contractor shall not create barriers to open and fair opportunities to participate in County contracts or to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction and services. In considering offers from and doing business with subcontracts and suppliers, the Contractor shall not discriminate against any person on the basis of race, color, creed, religion, sex, age,

nationality, marital status, sexual orientation or the presence of any mental or physical disability in an otherwise qualified disabled person.

C. Record-Keeping Requirements The Contractor shall maintain, for at least 12 months after completion of all work under this contract, records and information necessary to document its level of utilization of M/WBEs and other businesses as subcontracts and suppliers in this contract and in its overall public and private business activities for the same period. The Contractor shall also maintain, for at least 12 months after completion of all work under this contract, all written quotes, bids, estimates or proposals submitted to the Contractor by all businesses seeking to participate on this Contract. Contractor shall make such documents available to the County for inspection and copying upon request. If this contract involves federal funds, Contractor shall comply with all record keeping requirements set forth in any federal rules, regulations or statutes included or referenced in the contract documents.

D. Open Competitive Opportunities King County encourages the utilization of minority owned businesses ("MBEs") and women-owned businesses ("WBEs")(collectively, "M/WBEs") in County contracts. The County encourages the following practices to promote open competitive opportunities for small businesses including M/WBEs:

1) Attending a pre-bid or pre-solicitation conference, if scheduled by the County, to provide project information and to inform M/WBEs and other firms of contracting and subcontracting opportunities.

2) Placing all qualified small businesses attempting to do business in King County, including M/WBEs, on solicitation lists, and providing written notice of subcontracting opportunities to M/WBEs and all other small businesses capable of performing the work, including without limitation all businesses on any list provided by the County, in sufficient time to allow such businesses to respond to the written solicitations.

3) Breaking down total requirements into smaller tasks or quantities, where economically feasible, in order to permit maximum participation by small businesses including M/WBEs.

4) Establishing delivery schedules, where the requirements of this Contract permit, that encourage participation by small businesses, including M/WBEs.

5) Providing small businesses including M/WBEs that express interest with adequate and timely information about plans, specifications, and requirements of the Contract.

6) Utilizing the services of available community organizations, contractor groups, local assistance offices, the County, and other organizations that provide assistance in the recruitment and placement of small businesses including M/WBEs.

Further, the County encourages small businesses, including M/WBEs, to participate in the following practices to promote open competitive opportunities:

1) Attending a pre-bid or pre-solicitation conference, if scheduled by the County, to receive project information and to inform prime bidders/proposers of contracting and subcontracting capabilities.

2) Requesting placement on solicitation lists, and receipt of written notice of subcontracting opportunities.

3) Utilizing the services of available community organizations, contractor groups, local assistance offices, the County, and other organizations that provide assistance in the recruitment and placement of small businesses and M/WBEs.

E. Sanctions for Violations Any violation of the mandatory requirements of the provisions of this Section shall be a material breach of contract for which the Contractor may be subject to damages and sanctions provided for by contract and by applicable law.

PART 4: REQUIREMENTS DURING WORK

A. Site Visits King County may at any time visit the site of the work and the Contractor's office to review records related to actual utilization of and payments to subcontracting firms. The Contractor shall maintain sufficient records necessary to enable King County to review utilization of subcontracting firms. The Contractor shall provide every assistance requested by King County during such visits.

1-26 Proposal Alternatives

Proposals shall address all requirements identified in this RFP. In addition, the County may consider Proposal Alternatives submitted by Proposers that provide enhancements beyond the RFP requirements. Proposal Alternatives may be considered if deemed to be in the County's best interests. Proposal Alternatives must be clearly identified.

1-27 Supported Employment Program

King County encourages the creation of supported employment programs for developmentally and/or severely disabled individuals. The County itself has such a program and is actively seeking to do business with those Contractors and Consultants which share this employment approach. If your firm has such a program, or intends to develop such a program during the life of this contract, please submit documentation supporting this claim with your proposal. If you have questions, or need additional information, please contact the King County ADA Coordinator, (206) 296-7706 or the Department of Finance M/WBE Compliance Supervisor, (206) 689-4593.

1-28 Disadvantaged Business Enterprise (DBE) Participation

It is the County's policy that disadvantaged business enterprises (DBEs) shall have the maximum practicable opportunity to participate in the performance of contracts for the County. In this regard, the Proposer shall take all necessary and reasonable steps to ensure that DBEs have the maximum opportunity to participate in the performance of subcontracts and agreements hereunder. The Proposer shall not discriminate or tolerate harassment or abuse on the basis of creed, race, religion, color, sex, sexual orientation, age, national origin or the presence of any sensory, mental or physical disability in the award and performance of such contracts and subcontracts.

A DBE is any firm certified as such at the date and time of Proposal by the Washington State Office of Minority and Women's Business Enterprise (OMWBE) or by the federal Small Business Administration under section 8(a) of the federal Small Business Act, as amended.

The County recognizes there may be few contracting opportunities for DBEs involved in performance under this RFP and therefore has not established a DBE participation goal. If the Proposer subcontracts any work under a contract awarded pursuant to this RFP, the Proposer shall make affirmative efforts to solicit and use DBEs.

Affirmative efforts shall include, at a minimum, that the Proposer take the following steps prior to entering into any subcontracts:

A. Contact the County's Minority/Women Business Enterprise Office to explain the work to be subcontracted and to obtain a listing of DBEs which may be interested in performing such subcontract work;

B. Solicit Proposals from such DBEs; and

C. Award subcontracts to such DBEs which provide reasonable Proposals.

The Proposer shall complete and submit as part of its Proposal the Sworn Statement Regarding Disadvantaged Business Enterprise Commitment set forth in Attachment F of this RFP.

Failure to comply with the DBE requirements will be grounds for contract termination. If the Contractor subcontracts work hereunder and fails to comply with the DBE participation requirements set forth herein, then the County may declare a breach of contract and avail itself of all remedies under this contract and by law on account of such breach.

PART A: SECTION 2 - PROPOSAL EVALUATION AND CONTRACT AWARD

2-1 General

Proposals will be evaluated and ranked by the Proposal Evaluation Team (PET) on the basis of the criteria established in this RFP. The PET will evaluate the Proposals submitted in response to the RFP, conduct fact finding, discussions/negotiations, request best and final offers and determine which Proposal is the most advantageous to the County for contract award. The PET's recommendation is subject to review and approval.

2-2 Changes in Requirements

When, either before or after receipt of Proposals, the County changes, revises, increases, or otherwise modifies its requirements, the County shall issue a written addendum to the RFP. In considering which firms to notify of a change, the County will consider the stage in the procurement process at which the change occurs and the magnitude of the change, as follows:

A. If Proposals are not yet due, the addendum will be sent to all firms that have received the RFP.

B. If the time for receipt of Proposals has passed but Proposals have not been evaluated, the addendum will be sent only to Proposers responding to the RFP.

C. If the Proposals have been evaluated and classified, only those Proposals classified as in the competitive range.

D. If a change is so substantial that it warrants substantial revision of the RFP, the County may cancel the original RFP and issue a new one, regardless of the state of the procurement process. The new solicitation will be issued to all firms originally solicited and to any firms added to the original list.

2-3 Proposal Evaluation

The PET will evaluate each Proposal using the criteria set forth in this RFP. If deemed necessary by the PET, written and/or oral discussions may be conducted with those Proposers whose Proposals are found to be potentially acceptable. Identified deficiencies, technical requirements, terms and conditions of the RFP, costs or prices, and suspected mistakes may be included among the items for discussion. The discussions are intended to give Proposers a reasonable opportunity to resolve deficiencies, uncertainties and suspected mistakes as requested by the PET and to make the cost, pricing or technical revisions required by the resulting changes.

Upon completion of discussions, the PET may issue to all remaining potentially acceptable Proposers a request for Best and Final Offers. The request will include notice that discussions are concluded, an invitation to submit a revised Proposal with a Best and Final Offer, and a new submittal date and time.

The County reserves the right to make a contract award without written and/or oral discussions with the Proposers and without an opportunity to submit Best and Final Offers when deemed to be in the County's best interests.

2-4 Evaluation of the Best and Final Offer

After requesting Best and Final Offers, if requested, the PET will evaluate the Proposal or Proposals which have been preliminarily identified as most advantageous through analysis of information derived

from the Proposal, the County's records, other relevant sources and information provided by the Proposer. The PET may request that the Proposer provide additional information, explanation and documentation such as the following:

A. Responsiveness

The County will consider all the material submitted by the Proposer to determine whether the Proposer's offering is in compliance with the terms and conditions set forth in this RFP.

B. Responsibility

1. The County will consider all the material submitted by the Proposer, and other evidence it may obtain otherwise, to determine whether the Proposer is capable of and has a history of successfully completing contracts of this type. This may include requiring the Proposer to provide references from customers who have been provided the same or equivalent goods or services. References shall include the names and addresses of the parties to whom such goods or services were provided and the name and phone number of contact persons with such parties.

2. The following elements will be given consideration by the County in determining whether a Proposer is responsible:

   a. the ability, capacity and skill of the Proposer to perform the contract or provide the service required;

   b. the character, integrity, reputation, judgment and efficiency of the Proposer;

   c. whether the Proposer has the financial resources and experience to perform the contract properly and within the times specified;

   d. the quality and timeliness of performance by the Proposer on previous contracts with the County and with other local governments and state and federal agencies, including, but, not limited to, the relative costs, burdens, time and effort necessarily expended by the County and such governments and agencies in securing satisfactory performance and resolving claims;

   e. the previous and existing compliance by the Proposer with laws relating to public contracts or services, including, but not limited to, minority and women business enterprise and equal employment opportunity requirements;

   f. the history of the Proposer in filing claims and litigation on prior projects involving the County or on other public or private projects; and

   g. such other information as may be secured having a bearing on the decision to award the contract.

Proposers shall furnish acceptable evidence of the Proposer's ability to perform, such as firm commitments by subcontractors, equipment, supplies and facilities, and the Proposer's ability to obtain the necessary personnel, when requested by the County. Refusal to provide such information when requested will cause the Proposal to be rejected.

C. Financial Resources

Submit proof of adequate financial resources which would be available to the Proposer for the prosecution and completion of the work as required. When requested, the required financial information shall include:

1. audited financial statements such as balance sheets, five (5) statements of income, statements of cash flow and stockholders' equity for each of the most recently completed fiscal years, including notes to financial statements, independent accountants' reports and annual reports to stockholders;

2. documentation of an open line of credit or other arrangement with an established bank under which adequate financing would be available for prosecution and completion of the work called for hereunder;

3. certification by the principal financial officer of or an independent accountant for the Proposer, stating that the Proposer has adequate financial resources for the prosecution and completion of the work called for hereunder; and

4. the names, addresses and telephone numbers of at least one contact in the company's principal financial or banking organization and its independent auditor.

5. the Proposer shall supply when requested written authorization for the County to contact their bank and the independent accountant, and written authorization requiring the bank and independent accountant to provide the information to the County regarding financial capability.

The PET may find that the Proposer appears fully qualified to perform the contract or it may require additional information or actions from the Proposer. In the event the PET determines that there are problems of such a nature or magnitude that it is advantageous to the County to bypass the highest scored Proposal, the PET shall evaluate the qualifications of the next ranked Proposer for award of the contract. A Proposer bypassed for award by the PET for whatever reason shall have no claim for costs incurred including, but not limited to, presentation costs, Proposal preparation, the cost of providing additional information requested, or modification made either to its Proposal or internal structure or systems of the Proposer or its organization.

D. Financial Reporting

The Proposer shall provide a current copy of its Dun and Bradstreet report if requested by the County.

2-5 Scoring and Evaluation Criteria

Each Proposal has a total possible score of 1,000 points with the points assigned as follows:

	(Number)	(Title)	(Score)
Subsection	6	Management Requirement	250 points
Subsection	6	TechnicalRequirement	300 points
Subsection		Cost/Price Requirement	450 points
		[Total available points: 1,000]	

The PET will score each Proposal on the completeness and adequacy of the Proposer's responses and on additional available relevant information.

Additional criteria utilized in the evaluation are cited in the RFP and questions, SECTION 7.

2-6 Competitive Range

The evaluation of proposals and subsequent testing may result in successive reductions of the number of proposals that remain in the competitive range. The firms remaining in the competitive range may be invited to participate in additional evaluations, testing, best and final offer and negotiations.

2-7 Negotiations

The County may enter negotiations with one or more Proposers to finalize contract terms and conditions. In the event negotiations are not successful, the County may initiate negotiations with the next ranking Proposers or reject Proposals.

Negotiation of a contract will be in conformance with applicable federal, state and local laws, regulations and procedures. The objective of the negotiations will be to reach agreement on all provisions of the proposed contract.

2-8 Contract Award

Contract award, if any, will be made by the County to the responsible Proposer whose Proposal meets the requirements of the RFP, and will be the most advantageous to the County with respect to price, quality and other factors as evaluated by the County. The County is not required to award a contract to the Proposer offering the lowest price. The County shall have no obligations until a contract is signed between the Proposer and the County. The County reserves the right to award one or more contracts as it determines to be in its best interest.

2-9 Insurance Requirements

The Proposer to whom the County awards a contract pursuant to this RFP shall file with the County evidence of insurance from insurer(s) satisfactory to the County certifying to the coverages of insurance set forth in this RFP. Such evidence of insurance shall be submitted within ten calendar days of receipt of a written request from the County.

Failure by the Proposer to submit satisfactory evidence of insurance shall result in rejection of the Proposal.

2-10 Execution of Contract and Notice to Proceed

The Proposer to whom the County intends to award the contract shall sign the Agreement and return it to the County. Upon authorization by the County Executive, or designee, a contract will be issued. Upon receipt by King County of any required documentation and submittals by the Proposer, a Notice to Proceed may be issued, if appropriate.

2-11 Public Disclosure of Proposals

Proposals submitted under this RFP shall be considered public documents and with exceptions provided under public disclosure laws Proposals which are recommended for contract award will be available for inspection and copying by the public after the selection process has been concluded.

If a Proposer considers any portion of its Proposal to be protected under the law, the Proposer shall clearly identify each such portion with words such as "CONFIDENTIAL," "PROPRIETARY" or "BUSINESS SECRET." If a request is made for disclosure of such portion, the County will determine whether the material should be made available under the law. If the material is not exempt from public disclosure law,

the County will notify the Proposer of the request and allow the Proposer five (5) days to take whatever action it deems necessary to protect its interests. If the Proposer fails or neglects to take such action within said period, the County will release the portions of the Proposal deemed subject to disclosure. By submitting a Proposal, the Proposer assents to the procedure outlined in this paragraph and shall have no claim against the County on account of actions taken under such procedure.

PART A: SECTION 3 - STANDARD CONTRACTUAL TERMS AND CONDITIONS

3-1 Administration

This contract is between the County and the Contractor who will be responsible for providing the goods and/or performing the services described herein. The County is not party to defining the division of work between the Contractor and its subcontractors, if any, and the specifications have not been written with this intent.

The Contractor represents that it has or will obtain all personnel and equipment required to perform hereunder. Such personnel shall not be current or former employees of the County without the written approval of the County. Any current or former County employee who is involved, or becomes involved, in the performance of the contract must be disclosed according to Attachment G; and the County will determine whether conflicts of interest or ethical violations exist under the circumstances.

The Contractor's performance under this contract will be monitored and reviewed by Trevor Emtman, (206/263-3713), Project Manager, appointed by the County. Reports and data required to be provided by the Contractor shall be delivered to the contract administrator. Questions by the Contractor regarding interpretation of the terms, provisions and requirements of this contract shall be addressed to the contract administrator for response.

3-2 Change Orders

The County may, at any time, without notice to the sureties, by written order, make any change in the work within the scope of this contract. No oral order or conduct by the County will constitute a change order unless confirmed in writing by the County.

If any change order causes an increase or decrease in the cost of, or the time required for performance of any part of the work under this contract, an equitable adjustment in the contract price, the delivery schedule, or both shall be made and the contract modified in writing accordingly. Every change order may require a cost/price analysis to determine the reasonableness of the proposed change.

The Contractor must assert its right to an adjustment under this clause within five (5) calendar days after receipt of a written change order from the County. Upon request from the Contractor, the County may extend the five (5) day period. The request for equitable adjustment must be in writing and state the general nature and monetary extent of the claim. The County may require additional supporting documents and cost or price analysis to determine the validity of the claim.

No claim by the Contractor for an equitable adjustment hereunder will be allowed if asserted after final payment under this contract. No claim will be allowed for any costs incurred more than ten days before the Contractor gives written notice, as required in this section.

3-3 Cost/Price Analysis

Cost/price analysis will be required by the County for the evaluation of proposals, best and final offers, negotiations, change orders, terminations, revisions to contract requirements or other circumstances as determined by the Buyer.

3-4 Termination for Convenience/Default/Non-Appropriation

A. Termination for Convenience

The County for its convenience may terminate this contract, in whole or in part, at any time by written notice sent certified mail, return receipt requested, to the Contractor. After receipt of a Notice of Termination, and except as directed by the contract administrator, the Contractor shall immediately stop work as directed in the Notice, and comply with all other requirements in the Notice. The Contractor shall be paid its costs, including necessary and reasonable contract close-out costs and profit on that portion of the work satisfactorily performed up to the date of termination as specified in the notice. The Contractor shall promptly submit its request for the termination payment, together with detailed supporting documentation. If the Contractor has any property in its possession belonging to the County, the Contractor will account for the same and dispose of it in the manner the County directs. All termination payment requests are subject to cost/price analysis to determine reasonableness and compliance with the contract; the contract termination agreement , applicable laws and regulations.

B. Termination for Default

In addition to termination for convenience, if the Contractor does not deliver supplies in accordance with the contract delivery schedule, or if the contract is for services and the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other material provisions of the contract, the County may terminate this contract, in whole or in part, for default. Termination shall be effected by serving a Notice of Termination by certified mail (return receipt requested) on the Contractor setting forth the manner in which the Contractor is in default and the effective date of termination; provided that the Contractor shall have ten (10) calendar days to cure the default. The Contractor will only be paid for goods delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract less any damages to the County caused by or arising from such default. All termination payment requests are subject to cost/price analysis to determine reasonableness and compliance with the contract; the contract termination agreement , applicable laws and regulations.

The termination of this contract shall in no way relieve the Contractor from any of its obligations under this contract nor limit the rights and remedies of the County hereunder in any manner.

C. Termination for Non-Appropriation

If expected or actual funding is withdrawn, reduced or limited in any way prior to the termination date set forth in this contract or in any amendment hereto, the County may, upon written notice to the Contractor, terminate this Contract in whole or in part. Such termination shall be in addition to the county's rights to terminate for convenience or default.

In accordance with King County Code 4.04, 040B.6, payment shall not exceed the appropriation for the year in which termination is effected. If the Contract is terminated for non-appropriation:

1. The County will be liable only for payment in accordance with the terms of this contract for services rendered prior to the effective date of termination; and

2. The Contractor shall be released from any obligation to provide further services pursuant to the contract as are affected by the termination.

Funding under this contract beyond the current appropriation year is conditional upon the appropriation by the County Council of sufficient funds to support the activities described in this

contract. Should such an appropriation not be approved, the contract will terminate at the close of the current appropriation year. The appropriation year ends on December 31 of each year.

3-5 Force Majeure

The term "force majeure" shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, fire, accidents, shutdowns for purpose of emergency repairs, strikes and any other industrial, civil or public disturbances, causing the inability to perform the requirements of this contract. If any party is rendered unable, wholly or in part, by act of nature or any other cause not reasonably within such party's control, to perform or comply with any obligation or condition of this contract, upon giving notice and reasonably full particulars to the other party, such obligation or condition shall be suspended only for the time and to the extent reasonably necessary to restore normal operations. In the event the Contractor ceases to be excused pursuant to this provision, then King County shall be entitled to exercise any remedies otherwise provided for in this contract, including Termination for Default.

3-6 Payment Procedures

A. Invoices

Invoices shall be furnished by the Contractor for goods and/or services, which have been delivered or provided to the County, to:

King County
Accounts Payable M/S EXC-FI-0750
821 Second Avenue
Seattle, Washington 98104-1598

Important -- The County requires one invoice per requisition for payment processing. All invoices must include the following information: contract number, requester's name and phone number, date of invoice, invoice number, purchase order number, prompt payment discount and total price for invoice. For each item purchased indicate quantity, description, part number, model and serial number; where applicable, manufacturers or wholesale list price and discount percentage allowed off the list price, item price and total price for the item and/or for services identify hourly rates, hours worked, total hours or related fees. Failure to comply with this requirement may delay payment.

B. Payments

Within thirty (30) calendar days after receipt of an invoice, the County will pay the Contractor for authorized goods and/or services satisfactorily delivered or performed. Acceptance of such payment by the Contractor shall constitute full compensation for all supervision, labor, supplies, materials, work, equipment and the use thereof, and for all other necessary expenses, incurred by the Contractor.

C. The payment schedule is as follows:

1. Five (5 %) percent of the total dollar amount may be invoiced upon King County Metro's approval of the first submittal.

2. Ten (10 %) percent of the total dollar amount may be invoiced upon King County Metro's approval of the second submittal.

3. Seventy (70 %) percent of the total dollar amount may be invoiced upon delivery of the Substations.

4. Ten (10 %) percent may be invoiced upon completion and King County Metro's approval of field testing and training.

5. The remaining five (5 %) percent may be invoiced upon receipt of final Operations and Maintenance Manuals, including As-Built information.

3-7 Washington State Sales Tax

King County has determined that the work to be performed under this Contract is exempt from retail sales tax pursuant to RCW 82.04.050 and WAC 458.20.171 ("Rule 171"). Therefore, retail sales taxes (state and local) will not be paid by King County on the Contract Price. Bidders are advised that they may be considered the consumers of all materials, equipment and supplies, including prefabricated and precast items, used or consumed by them in performing the Work and would be responsible for paying the retail sales/use tax to their materialmen and suppliers. Bidders shall include an amount equal to such taxes, if applicable, in their bids. If a bidder has questions regarding application of Rule 171, the bidder should contact the Washington State Department of Revenue.

3-8 Taxes, Licenses, and Certificate Requirements

This contract and any of the services or supplies provided hereunder are contingent and expressly conditioned upon the ability of the Contractor to provide the specified service or supplies consistent with federal, state and local law and regulations. If, for any reason, the Contractor's required licenses or certificates are terminated, suspended, revoked or in any manner modified from their status at the time this contract becomes effective, the Contractor shall notify the County immediately of such condition in writing.

The Contractor shall maintain and be liable for all taxes, fees, licenses and costs as may be required by federal, state and local laws and regulations for the conduct of business by the Contractor and any subcontractors and shall secure and maintain such licenses and permits as may be required to provide the services or supplies under this Contract.

3-9 Price Warranty

The Contractor warrants that the prices charged the County do not exceed the prices charged by the Contractor to any other customer purchasing the same product or service in like or similar quantities, and under similar terms and conditions.

3-10 Defective Work, Materials or Services

Prior to final acceptance hereunder, when and as often as the County determines that the work, materials or services furnished under the contract are not fully and completely in accordance with any requirement of the contract, it may give notice and description of such non-compliance to the Contractor. Within **ten (10)** calendar days of receiving such written notification, the Contractor must supply the County with a written detailed plan which indicates the time and methods needed to bring the work, materials or services within acceptable limits of the specifications. The County may reject or accept this plan at its discretion. In the event this plan is rejected, the work, materials or services will be deemed not accepted and returned to the Contractor at the Contractor's expense. This procedure to remedy defects is not intended to limit or preclude any other remedies available to the County by law, including those available under the Uniform Commercial Code, Title 62A RCW.

3-11 No Waiver of Warranties and Contract Rights

Conducting of tests and inspections, review of specifications or plans, payment for a product or service, or acceptance of a product or service by the County shall not constitute a waiver, modification or exclusion of any express or implied warranty or any right under this contract or in law.

3-12 Assignment

No party shall assign any interest, obligation or benefit under or in this Contract or transfer any interest in the same, whether by assignment or novation, without prior written consent of the other party. If assignment is approved, this Contract shall be binding upon and inure to the benefit of the successors of the parties. This provision shall not prevent Contractor from pledging any proceeds from this Contract as security to a lender. An assignment shall be accepted by either party upon the posting of all required bonds, securities and the like by the assignee, and the written Agreement by assignee to assume and be responsible for the obligations and liabilities of the Contractor or County, known and unknown, under this Agreement and applicable law.

3-13 Indemnification and Hold Harmless

The successful awardee shall protect, defend, indemnify, and hold the County, its agents, employees, officials, and officers harmless from, and shall process and defend at its own expense any and all claims, demands, suits, penalties, losses, damages, or costs of any kind whatsoever (hereinafter "claims") brought against the County arising out of or incident to the execution of, performance of, or failure to perform this Contract; PROVIDED, however, that if such claims are caused by or result from the concurrent negligence of the successful awardee, its agents, employees, and/or officers and the County, its agents, employees, and/or officers, this paragraph shall be valid and enforceable only to the extent of the negligence of the successful awardee, its agents, employees, and/or officers; and, PROVIDED FURTHER, that nothing in this paragraph shall require the successful awardee to indemnify, hold harmless, or defend the County, its agents, employees, and/or officers from any claims caused by or resulting from the sole negligence of the County, its agents, employees, and/or officers. The successful awardee's obligation under this paragraph shall include indemnification for claims made by the successful awardee's own employees or agents. For this purpose, the successful awardee, by mutual negotiation, hereby waives, with respect to the County only, any immunity that would otherwise be available against such claims under the Industrial Insurance provisions of Title 51 R.C.W. In the event the County incurs any judgment, award, and/or cost arising therefrom including attorneys' fees to enforce the provisions of this paragraph, and such fees, expenses, and costs shall be recoverable from the successful awardee.

3-14 Applicable Law and Forum

Except as hereinafter specifically provided, this Contract shall be governed by and construed according to the laws of the State of Washington, including, but not limited to, the Uniform Commercial Code, Title 62A RCW. Any suit arising here from shall be brought in the King County Superior Court or U.S. District for the Western District of Washington, in Seattle, which forum shall have sole and exclusive jurisdiction and venue.

3-15 Conflicts of Interest and Non-Competitive Practices

A. Conflict of Interest

The Contractor, by entering into this Contract with the County to perform or provide work, services or materials, has thereby covenanted that it has no direct or indirect pecuniary or proprietary interest, and that it shall not acquire any interest, which conflicts in any manner or degree with the work, services or materials required to be performed and/or provided under this

contract and that it shall not employ any person or agent having any such interest. In the event that the Contractor or its agents, employees or representatives hereafter acquires such a conflict of interest, it shall immediately disclose such interest to the County and take action immediately to eliminate the conflict or to withdraw from this contract, as the County may require.

B. Contingent Fees and Gratuities

The Contractor, by entering into this contract with the County to perform or provide work, services or material, has thereby covenanted:

1. No person or selling agency except bona fide employees or designated agents or representatives of the Contractor has been or will be employed or retained to solicit or secure this contract with an agreement or understanding that a commission, percentage, brokerage, or contingent fee would be paid; and

2. No gratuities, in the form of entertainment, gifts or otherwise, were offered or given by the Contractor or any of its agents, employees or representatives, to any official, member or employee of the County or other governmental agency with a view toward securing this contract or securing favorable treatment with respect to the awarding or amending, or the making of any determination with respect to the performance of this contract.

3-16 Disputes, Claims and Appeals

The Contractor shall address questions or claims regarding meaning and intent of the Contract or arising from this Contract in writing to the Buyer, within ten (10) calendar days of the date in which the Contractor knows or should know of the question or claim. The buyer will ordinarily respond to the Contractor in writing with a decision, but absent such written response, the question or claim shall be deemed denied upon the tenth day following receipt by the Buyer.

In the event the Contractor disagrees with any determination or decision of the Buyer, the Contractor may, within five (5) calendar days of the date of such determination or decision, appeal the determination or decision in writing to the Procurement Services Division Manager. Such written notice of appeal shall include all documents and other information necessary to substantiate the appeal. The Procurement Services Division Manager will review the appeal and transmit a decision or determination in writing. The decision will be considered final. Appeal to the Procurement Services Division Manager shall be a condition precedent to litigation hereunder.

All claims, counterclaims, disputes and other matters in question between the County and the Contractor that are not resolved between the Procurement Services Division Manager and the Contractor or through alternative dispute resolution will be decided in the Superior Court of King County, Washington, which shall have exclusive jurisdiction and venue over all matters in question between the County and the Contractor. Mediation or arbitration are not mandatory prerequisites to filing a lawsuit.

Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the direction of the Buyer. Failure to comply precisely with the time deadlines under this subsection as to any claim shall operate as a waiver and release of that claim and an acknowledgment of prejudice to the County.

3-17 Mediation and Arbitration

Nothing in this paragraph precludes any party from seeking relief from King County Superior Court or the U.S. District Court for the Western District of Washington, in Seattle. If a dispute arises out of or relates to this Contract, or the breach thereof, and if said dispute cannot be settled through direct discussions, the parties agree to first endeavor to settle the dispute in an amicable manner by mediation.

Thereafter, any unresolved controversy or claim arising out of or relating to this Contract, or breach thereof, may be settled by arbitration, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The parties to this Contract may seek to resolve disputes pursuant to mediation or arbitration, but are not required to do so.

3-18 Retention of Records, Audit Access and Proof of Compliance with Contract

A. Retention of Records

1. The Contractor shall maintain books, records and documents of its performance under this contract in accordance with generally accepted accounting principles. The Contractor shall maintain and retain for a period of not less than six (6) years after the date of final acceptance of contract work and all other pending matters are closed; all financial information, data and records used to prepare and support the Contractor's final proposal for this contract and invoicing for supplies or services and any payments resulting from change orders or claims. In addition, the Contractor shall maintain the financial information used in the preparation or support of any change orders or claims.

2. The Contractor shall ensure that its subcontractors and suppliers maintain and retain for no less than six (6)years all records pertaining to the performance by the subcontractors and suppliers of their portions of the work under this contract.

B. Audit Access

1. The County and its authorized representatives and designees shall have access to all records maintained and retained by the Contractor and its subcontractors for the purpose of inspection, cost/price analysis, audit or other reasonable purposes related to this contract. The County and its representatives and designees shall have access to records and be able to copy such records during the Contractor's normal business hours. The Contractor shall provide proper facilities for such access, inspection and copying.

2. Audits may be conducted during or after the contract period for purposes of evaluating claims by or payments to the Contractor and for any other reason deemed appropriate and necessary by the County. Audits will be conducted by auditors selected and paid for by the County. Audits shall be conducted in accordance with generally accepted auditing standards and/or audit procedure and guidelines of the County. The Contractor shall fully cooperate with the County or its auditor(s) during audits and inspections, and provide all requested documentation.

3. If an audit is commenced more than sixty (60) days after the date of final acceptance of contract work, the County will give reasonable notice to the Contractor of the date on which the audit will begin.

4. The Contractor shall maintain records relating to the pricing of spare parts. The County will have access to such records for audit purposes.

5. The Contractor may be required to sign a "Certificate of Current Cost or Pricing Data."

C. Proof of Compliance with Contract

The Contractor shall, at any time when requested, submit to the County properly authenticated documents or other satisfactory proofs as to the Contractor's compliance with such requirements.

In addition, the Contractor will permit the County, and if federally funded, the FTA and the Comptroller General of the United States, or a duly authorized representative, to inspect all work, materials, payrolls and other data and records involving the contract.

3-19 Other Public Agency Orders

Other federal, state, county and local entities may utilize the terms and conditions established by this contract if formally requested and approved by the Buyer. A formal cooperative purchasing agreement will be executed in such cases. The County does not accept any responsibility or involvement in the purchase orders or contracts issued by other public agencies

3-20 Recycled Products Policy

The County promotes the purchase and utilization of recycled material and products where available. Recycled material means material and byproducts which have been recovered or diverted from solid waste disposal for the purpose of recycling. It does not include those materials and byproducts generated from, and commonly reused within, an original manufacturing process. In the event of similar pricing, availability and other factors affecting the solicitation, preference may be given to products containing recycled material.

The Contractor shall, when requested by the contract administrator, provide documentation indicating the recycled materials used and their proportion of the total value of the end product. Where recycled materials were available but non-recycled materials were actually used, in whole or in part, the Contractor shall furnish the content by price/volume of recycled and non-recycled material used, and shall furnish an explanation of the reason that recycled materials were not used.

PART A: SECTION 4 - SPECIFIC CONTRACTUAL TERMS AND CONDITIONS

4-1 Contract Documents and Precedence

The documents constituting the contract between the County and the Contractor are intended to be complementary so that what is required by any one of them shall be as binding as if called for by all of them. In the event of any conflicting provisions or requirements within the several parts of the Contract Documents, they shall take precedence as listed on the "Agreement".

4-2 Contract Period

The period of this Contract shall be two (2) years, commencing on the date of execution of this Contract. Upon written notice by King County, this Contract may be extended for three (3) additional one year periods. During extension periods, all terms and conditions of this Contract shall remain in effect except those amended for the extension period. The maximum term for this Contract, consisting of the base period plus extensions, is five (5) years.

4-3 Contract Agreement

Contract award will occur when King County signs the Agreement and issues the Contract Agreement. No other act of the County shall constitute contract award. The Contract Agreement is a computer-generated document with the awarded Contract number referencing the Agreement and describing the awarded goods and/or services. The Contract Agreement will establish the Contract value and incorporate the terms of this document, but will not be the authorization for the Contractor to proceed. After Contract award, the Project Manager will issue Purchase Orders detailing the goods and/or services to be delivered.

4-4 Purchase Orders

Purchase Orders will be issued referencing this Contract Agreement number. The Purchase Orders will define and authorize the delivery of goods and services by the Contractor with a "not to exceed price" (based on the prices contained in Attachment B and estimated other direct costs, if applicable.) The purchase orders issued by Procurement Services Division may also modify the contract terms, funding or other matters subject to Subsection 3-2 Change Orders.

4-5 Shipping Charges

All prices shall include freight FOB to the designated delivery point. Requests for additional compensation for freight charges will be rejected by the County.

4-6 Cost Mark-Up (Not Used)

4-7 Direct Costs Related to Additional Work

Direct costs for additional work shall be billed at cost without markup, as noted below or as revised by legislative action of the Council:

Reimbursement of Contractor travel, lodging and meal expenses are limited to the eligible costs based on the rates and criteria established in King County Code, chapter 3.24.

A. The mileage rate allowed by King County shall not exceed the current Internal Revenue Services (IRS) rates per mile as allowed for business related travel. The IRS mileage rate will be paid for the operation, maintenance and depreciation of individually owned vehicles for that time which the vehicle is used during work hours. Parking shall be the actual cost. When rental vehicles are

authorized, government rates shall be requested. If a person does not request government rates, he/she may be personally responsible for the difference. Please reference the IRS web site for current rates. http://www.irs.gov/.

B. Reimbursement for meals shall be limited to the per diem rates established by Federal travel requisitions for the host city in the code of Federal Regulations, 41 CFR § 301,App.A.

C. Accommodation rates shall not exceed the Federal Lodging limit plus host city taxes. The Contractor must always request government rates.

D. The direct costs contained in A, B and C above will only be authorized by the King County Project Manager for Contractor staff living beyond commuting distance, normally considered to be for the travel beyond 100 miles of 821 Second Avenue, Seattle, WA.

E. Air travel shall be by coach class at the lowest price available at the time the King County Project Manager requests a particular trip. In general, a trip is associated with a particular work activity of limited duration and only one round-trip ticket, per person, will be billed per trip.

F. Cost for equipment, materials and supplies, such as approved equipment rental; telephone, telegraph and cable expenses; reproduction costs including blueprinting, photographing, telecopying, mimeographing, photocopying and printing; express charges; commercial printing, binding, art work and models; and, computer programming and keypunching costs shall be billed without markup.

G. Authorized subcontract services; provided that the limitations set forth in the above paragraphs shall be applicable to such subcontract services.

H. Other direct costs, not listed above, may be billed if the County has given prior approval.

I. Receipts required for purchases $10 and over, not including meals.

4-8 Guarantee/Warranty

The Contractor guarantees the goods and services furnished under this Contract will be free from defects in material and workmanship, and will conform with all requirements of this contract**,** for a period of two (2) years from date of final acceptance of such goods and/or services by the County. The Contractor is responsible for all costs of replacement, including shipping charges, for goods or services found defective within that period, regardless of who actually corrects the defect.

The County shall give written notice of any defect to the Contractor. If the Contractor has not corrected defect with thirty (30) calendar days after receiving the written notice, the County, in its sole discretion, may correct the defect itself. In the case of an emergency where the County believes delay could cause serious injury, loss or damage, the County may waive the written notice and correct the defect. In either case, the County will charge-back the cost for such warranty repair to the Contractor.

The Contractor shall ensure that the warranty requirements of this contract are enforceable through and against the Contractor's suppliers, vendors, distributors and subcontractors. The Contractor is responsible for liability and expense caused by any inconsistencies or differences between the warranties extended to the County by the Contractor and those extended to the Contractor by its suppliers, vendors, distributors and subcontractors. Such inconsistency or difference will not excuse the Contractor's full compliance with its obligations under this contract.

The Contractor, upon notice of award of the contract, shall promptly provide to the County complete copies of all written warranties or guarantees and/or documentation of any other arrangement relating to such warranties or guarantees extended to the Contractor by the Contractor's suppliers, vendors, distributors and subcontractors covering parts, components, subcomponents and systems procured through this contract. The Contractor shall cooperate with the County in facilitating warranty related work by such suppliers, vendors, distributors and subcontractors.

If the original parts or equipment manufacturer provides a warranty that is greater in scope or duration than the Contractor's warranty to the County, the County shall receive the increased warranty benefits.

The termination of this contract shall in no way relieve the Contractor from its warranty/guarantee responsibility.

Any goods or services corrected shall be subject to this subsection to the same extent as the goods or services initially provided.

This guarantee shall be in addition to any other express warranties or any implied warranties or remedies provided by this contract or by law, and in addition to any other rights or remedies available to the County under this contract or by law. No provision in this subsection shall be construed to limit the liability of the Contractor for work not done in accordance with the contract. The liability for such failure to perform shall extend as far as the appropriate periods of limitation provided by law.

The Contractor shall ensure the County receives warranty related work from its suppliers, distributors, proposers and subcontractors.

4-9 Hazardous Chemical Communication

In order to comply with WAC 296-62-054, Hazard Communication, the Contractor shall submit with the Proposal, a Material Safety Data Sheet (MSDS) for all products containing any toxic products that may be harmful to the end user. The MSDS Sheet is to accompany the toxic product(s) to the specified delivery sites.

Include the following information in the MSDS:

A. Chemical Abstract Service (CAS) numbers for every chemical that is listed in the MSDS.

B. If the product is actually used diluted, the dilution rate should be so stated in the MSDS and the hazards and corresponding personal protection, etc. also be listed.

C. SARA Title 3 chemicals must be listed with the percentage by weight of the total product.

D. A statement as to the intended use of the product.

4-10 Industrial and Hazardous Waste

The Contractor shall comply with all applicable local ordinances, state and federal statutes, and supporting rules and regulations governing the discharge of industrial waste to a public sewer, private sewer, or side sewer tributary to the metropolitan sewerage system.

Contractor shall handle and dispose of all hazardous wastes in compliance with all applicable local, state and federal laws and regulations, including the Resource Conservation and Recovery Act, the Washington Hazardous Waste Management Act, and applicable rules and regulations of the Environmental Protection Agency and the Department of Ecology governing the generation, storage, treatment, transportation or disposal of hazardous wastes.

4-11 Prohibition on Asbestos-Containing Products

Asbestos-containing products shall not be provided to the County under this Contract, unless no practicable alternative for the asbestos-containing product exists and the Contractor obtains the written consent of the County. The Contractor shall notify the County in writing at least sixty (60) days before it plans to supply the County with an asbestos-containing product. The County shall respond to such notification within thirty (30) days of receipt. The Contractor shall comply with applicable state, federal and local labeling and other laws, regulations and ordinances pertaining to asbestos-containing products, including, but not limited to, the State of Washington Industrial Safety and Health Act and the federal Occupational Safety and Health Act.

4-12 Patents and Royalties

The Contractor is responsible for paying all license fees, royalties or the costs of defending claims for the infringement of any patented invention, article, process or method that may be used in performing this contract or with the completed work. The Contractor and the Contractor's sureties shall indemnify and hold the County, together with its officers and employees, harmless against any and all demands made for such fees, royalties or claims brought or made by the holder of any invention or patent. Before final payment is made on the account of this contract, the Contractor shall, if requested by the County, furnish acceptable proof of a proper release from all such fees or claims.

Should the Contractor, its agent, servants or employees, or any of them be enjoined from furnishing or using any invention, article, material, computer programs or equipment supplied or required to be supplied or used under the contract, the Contractor shall notify the County in writing and promptly substitute other articles, materials, computer programs or equipment in lieu thereof of equal efficiency, quality, finish, suitability and market value, and be satisfactory in all respects to the County.

4-13 Product Return

King County reserves the right to return to the Contractor, those parts and supplies determined to be surplus and no longer required by the County.

Parts and supplies eligible for return to the Contractor shall have been purchased for inventory or as spares, be unused, and in the same general condition as when received. King County must advise the contractor in writing of its intention to return any parts and supplies before the contract closes.

The Contractor is authorized a restocking fee of 15% of the current price for the return of parts and supplies. The Contractor shall, at the County's option, issue a credit for the dollar value of the merchandise returned or refund that dollar amount (less any restocking fee) to the King County Department of Transportation.

This subsection does not apply to any merchandise made to order for King County.

4-14 Design Defects

In the event that like components purchased under this contract fail for like/same failure at a rate greater that declared the Contractor's submittal information it will declared by King County Metro

The warranty period and terms for corrected items shall be the same as for the initial items purchased under this contract.

In the event that during the warranty period repairs or modifications made necessary by design defects are not completed due to the lack of material or the inability to provide the proper repair, the extended period of the lack of correction shall not be considered in computing the warranty end date. The same warranty will remain in effect until a correction is implemented. Warranty on items determined to be design defects shall be extended for the time and/or miles of the original warranty. This extended warranty shall begin on the repair/replacement date of the redesign or modification for any corrected failures.

4-15 Escrow Agreement (Not Used)

4-16 Bug Status Reports (Not Used)

4-17 New Versions of Software (Not Used)

4-18 Year 2000 Compliance (Not Used)

4-19 Nondisclosure of Data

Data provided by King County either before or after contract award shall only be used for its intended purpose. Proposers, vendors, contractors and subcontractors shall not utilize nor distribute the King County data in any form without the express written approval of King County.

4-20 Acceptance Process and Criteria

The equipment will be accepted after successful completion of field tests, The Contractor shall submit to Contract/Project Manager a written certification that the equipment and components are ready to be turned over to King County.

During the performance period(s), the equipment must operate in substantial conformance with the vendor's proposal and system requirements and performance standard, as specified therein. King County will be the sole judge in determining whether the standard of performance has been achieved and whether the proposed equipment conforms to the vendor's proposal and system requirements.

If after forty-five (45) days of installation of the system, the performance standartd is not attained during a performance period, King County shall have the option of terminating the contract or initiating an additional period.

After the complete system has been installed, tested and accepted, the two year warranty period shall begin

4-21 Express Warranties (Not Used)

4-22 Implementation (Not Used)

4-23 Non-Disclosure Obligation

While providing the Service required under this Contract, the Contractor may encounter licensed technology, Software, Documentation, drawings, schematics, manuals, data or other materials marked "Confidential", "Proprietary" or "Business Secret". The Contractor shall, with regard to such information and material received or used in performance of this contract, employ practices no less than those used for the protection of the Contractor's own confidential information.

The AGREEMENT imposes no obligation upon the contractor with respect to confidential information which the Contractor can establish that: a) was in the possession of, or was rightfully known by the Contractor without an obligation to maintain its confidentiality prior to receipt from King County or a

Third (3rd) Party; b) is or becomes generally known to the public without violation of this Agreement; c) is obtained by the Contractor in good faith from a Third (3rd) Party having the right to disclose it without an obligation of confidentiality; or, d) is independently developed by the Contractor without the participation of individuals who have had access to King County's or the Third (3rd) Party's confidential information. The Contractor may disclose confidential information if so required by law, provided that the Contractor notifies King County that the Third (3rd) Party of such requirement prior to disclosure.

4-24 Disclosure (Not Used)

4-25 Pricing of Spare Parts

The County shall have the right to conduct a cost/price analysis on specific spare parts if pricing appears to be in excess of standard industry pricing for similar parts. Any differences shall be subject to negotiations to the satisfaction of the County.

Competitive pricing is defined as the circumstances in which the County could obtain Bids or Proposals from alternative sources for the same parts. Proprietary parts and noncompetitive parts will be considered sole source parts requiring justification of pricing.

4-26 Ancillary Equipment

Square D Programmable Logic Controllers to be used in conjunction with this procurement shall be purchased referencing Square D/King County agreement # C87054C.

4-27 Equipment and Software Support (Not Used)

4-28 System Enhancements, Upgrades, and Replacements (Not Used)

4-29 No Prototype Components

All proposed hardware, software and associated items, should be in production and be used by customers comparable to King County at the time of the proposal. Test or prototype items must be clearly identified as such. A sufficient inventory of the proposed product must be available to meet delivery requirements.

4-30 Changed Requirements

New Federal, State and County laws, regulations, ordinances, policies and administrative practices may be established after the date this Contract is established and may apply to this Contract. To achieve compliance with changing requirements, the Contractor agrees to accept all changed requirements that apply to this Contract and require subcontractors to comply with revised requirements as well. Changed requirements will be implemented through subsection 3-2 change orders.

4-31 Counterparts

This Contract may be signed in two counterparts, each of which shall be deemed an original and which shall together constitute one Contract.

4-32 Severability

Whenever possible, each provision of this Agreement will be interpreted to be effective and valid under applicable law. If any provision is found to be invalid, illegal or unenforceable, then such provision or portion thereof will be modified to the extent necessary to render it legal, valid and enforceable and have the intent and economic effect as close as possible to the invalid, illegal and unenforceable provision. If it

is not possible to modify the provision to render it legal, valid and enforceable, then the provision will be severed from the rest of this Agreement and ignored. The invalidity, illegality or unenforceability of any provision will not affect the validity, legality or enforceability of any other provision of this Agreement, which will remain valid and binding.

4-33 Liquidated Damages (Not Used)

4-34 Patents, Copyrights and Rights in Data (Not Used)

4-35 Performance and Payment Bond

The Proposer to whom the County awards this Contract shall furnish a performance and payment bond on the form provided in Attachment D, "Performance and Payment Bond," in the amount of 100 percent of the Contract Price as security for the faithful performance of the work, including the payment of all persons furnishing materials and performing labor on the work, and all payments arising from the performance of the work due the State of Washington pursuant to Titles 50 and 51 RCW. Such bond shall be submitted within ten (10) calendar days of receipts of a written request from the County. Such bond must be executed by a duly licensed surety company which is registered with the Washington State Insurance Commissioner, and the surety's name shall appear in the current Authorized Insurance Company List in the State of Washington published by the Office of the Insurance Commissioner. the scope of the performance and payment bond or the form thereof prescribed in Attachment D shall in no way affect or alter the liabilities of the Contractor to the County under subsection "Indemnification."

The County may require the sureties or surety company to appear and qualify themselves upon the bond. If at any time, the County determines, in its sole judgment, that the sureties or surety company are insufficient, the County may require the Contractor to furnish additional surety in form and arrangement satisfactory to the County and in an amount not exceeding that originally required. Payments will not be made on the contract until sufficient surety as required is furnished.

Failure by the Proposer to submit a satisfactory performance and payment bond shall be grounds for disqualifying the Proposer from further participation in this RFP and result in forfeiture of the proper Proposal security.

4-36 Labor Standards (Not Used)

4-37 Payment Procedures for Public Works Contracts (Not Used)

PART A: SECTION 5 - INSURANCE REQUIREMENTS

5-1 Evidence and Cancellation of Insurance

A. Prior to execution of the Contract, the Contractor shall file with the County evidence of insurance and endorsements from the insurer(s) certifying to the coverage of all insurance required herein. All evidence of insurance must be certified by a properly authorized officer, agent, general agent or qualified representative of the insurer(s) and shall certify the name of the insured, the type and amount of insurance, the location and operations to which the insurance applies, the expiration date, and that King County received notice at least 45 days prior to the effective date of any cancellation, lapse or material change in the policy.

B. The Contractor shall, upon demand of King County, deliver to King County all such policy of insurance, and all endorsements and riders, and the receipts for payment of premiums thereon.

Failure to provide such insurance in a time-frame acceptable to the King County shall enable King County to suspend or terminate the Contractor's work hereunder in accordance with contract provisions regarding "Termination for Convenience/Default/Non-appropriation." Suspension or termination of this contract shall not relieve the Contractor from its insurance obligations hereunder.

5-2 Insurance Requirements

A. The Contractor shall obtain and maintain the minimum insurance set forth below. By requiring such minimum insurance, the County shall not be deemed or construed to have assessed the risks that may be applicable to the Contractor under this contract. The Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage.

For all coverages:

Each insurance policy shall be written on an “occurrence” form; excepting that insurance for professional liability, errors and omissions when required, may be acceptable on a “claims made” form.

If coverage is approved and purchased on a “Claims made” basis, the contractor warrants continuation of coverage, either through policy renewals or the purchase of an extended discovery period, if such extended coverage is available, for not less than three (3) years from the date of completion of the work which is the subject of this contract.

B. Minimum Scope of Insurance

Coverage shall be at least as broad as:

1. General Liability

Insurance Services Office form number (CG 00 01 Ed. 11-88) covering COMMERCIAL GENERAL LIABILITY.

2. Automobile Liability

Insurance Service form number (CA 00 01 Ed. 12-90) covering BUSINESS AUTO COVERAGE, symbol 1 "any auto"; or the combination of symbols 2, 8 and 9.

3. Professional Liability

Professional Liability, Errors and Omissions coverage.

In the event that services pursuant to this Contract either directly or indirectly involve or require professional services, Professional Liability, Errors and Omissions coverage shall be provided. "Professional Services", for the purpose of this Contract section shall mean any services provided by a licensed professional.

4. Workers' Compensation

Workers' Compensation coverage, as required by the Industrial Insurance Act of the State of Washington, as well as any similar coverage required for this work by applicable federal or "Other States" State Law.

5. Employers Liability or "Stop Gap":

The protection provided by the Workers Compensation Policy Part 2 (Employers Liability) or, in states with monopolistic state funds, the protection provided by the "Stop Gap" endorsement to the General Liability policy.

C. Minimum Limits of Insurance

The Contractor shall maintain limits no less than, for:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage, and for those policies with aggregate limits, a $2,000,000 aggregate limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage.

3. Professional Liability, Errors and Omissions: $1,000,000.

4. Workers' Compensation: Statutory requirements of the state of residency.

5. Employers Liability Stop Gap: $1,000,000.

D. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to, and approved by, the County. The deductible and/or self-insured retention of the policies shall not limit or apply to the Contractor's liability to the County and shall be the sole responsibility of the Contractor.

E. Other Insurance Provisions

The insurance policies required in this contract are to contain, or be endorsed to contain the following provisions:

1. General Liability Policy:

   a. The County, its officers, officials, employees and agents are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor with this Contract.

   b. To the extent of the contractor's negligence, the Contractor's insurance coverage shall be primary insurance as respects the County, its officers, officials, employees and agents. Any insurance and/or self-insurance maintained by the County, its officers, officials, employees or agents shall not contribute with the insurance or benefit the contractor in any way.

   c. The contractor's insurance shall apply separately to each insured against whom a claim is made and/or lawsuit is brought, except with respect to the limits of the insurer's liability.

F. Acceptability of Insurers

Unless otherwise approved by the County:

Insurance is to be placed with insurers with a Bests' rating of no less than A:VIII, or, if not rated with Bests', with minimum surpluses the equivalent of Bests' surplus size VIII.

If at any time one of the foregoing policies shall be or become unsatisfactory to the County, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the County, the Contractor shall, upon notice to that effect from the County, promptly obtain a new policy, and shall submit the same to the County, with the appropriate certificates and endorsements, for approval.

G. Subcontractors

The contractor shall include all subcontractors as insureds under its policies, or shall furnish separate certificates of insurance and policy endorsements for each subcontractor. Insurance coverages provided by subcontractors as evidence of compliance with the insurance requirements of this contract shall be subject to all of the requirements stated herein.

H. Work Site Safety

The Contractor shall have the "right to control" and bear the sole responsibility for the job site conditions, and job site safety. The Contractor shall comply with all applicable Federal, State and Local safety regulations governing the job site, employees and subcontractors. The Contractor shall be responsible for the subcontractor's compliance with these provisions.

PART A: SECTION 6 - FEDERAL TRANSIT ADMINISTRATION (FTA) REQUIREMENTS

6-1 Applicability and Federal Grant Contract

This procurement is subject to a financial assistance contract between the County and the U.S. Department of Transportation. The successful Contractor is required to comply with all terms and conditions prescribed in third party contracts in the grant contract between the U.S. Department of Transportation and the County.

New federal laws, regulations, policies and administrative practices may be established after the date this contract is established and may apply to this contract. To achieve compliance with changing federal requirements, the Contractor agrees to accept all changed requirements that apply to this Contract and require subcontractors comply with revised requirements as well.

6-2 No Federal Government Obligations to Third Parties

The Contractor agrees that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of this Contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to the Contractor or any other party (whether or not a party to this Contract) pertaining to any matter resulting from this Contract.

The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

6-3 Disadvantaged Business Participation

It is the policy of the Federal Department of Transportation that disadvantaged business enterprises as defined in 49 CFR Part 23, and as amended in Section 106(c) of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (STURAA), 23 USC § 101 note, shall have maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds under this Contract. Consequently, the requirements of 49 CFR Part 23 and Section 106(c) of the STURAA apply to this Contract.

The Contractor agrees to ensure that disadvantaged business enterprises have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under this Contract. In this regard, the Contractor shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that disadvantaged businesses have the maximum opportunity to compete for and perform contracts. The Contractor shall not discriminate on the basis of race, color, creed, sex, disability, age or national origin in the award and performance of federal Department of Transportation assisted contracts.

6-4 Equal Employment Opportunity

In connection with the execution of this Contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, creed, sex, disability, age, or national origin. The Contractor shall take affirmative action to ensure that the hiring of applicants and treatment of employees during employment is conducted without regard to their race, color, creed, sex, disability, age, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. Contractor further agrees to

6-5 Title VI Compliance

The Contractor shall comply with and shall ensure the compliance by all subcontractors under this Contract with all the requirements imposed by Title VI of the Civil Rights Act of 1964 (42 USC 2000d) and the regulations of the federal Department of Transportation, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation -- Effectuation of Title VI of the Civil Rights Act," 49 CFR Part 21, (hereinafter "Regulations") as they may be amended from time to time.

During the performance of this Contract, the Contractor, for itself, its assignees and successors-in-interest agrees as follows:

A. Nondiscrimination

The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, creed, sex, disability, age or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

B. Solicitations for Subcontracts, Including Procurements of Materials and Equipment

In all solicitations either by competitive proposal or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the regulations relative to nondiscrimination on the grounds of race, color, creed, sex, disability, age or national origin.

C. Information and Reports

The Contractor shall provide all information and reports required by the regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the County or the Federal Transit Administration (FTA) to be pertinent to ascertain compliance with such regulations, orders and instructions. The Contractor shall maintain all required records for a least three (3) years after the County makes final payment and all other pending matters are closed. Where any information is required and it is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the County or the Federal Transit Administration, as appropriate, and shall set forth efforts made to obtain the information.

D. Sanctions for Noncompliance

In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the County shall impose such contract sanctions as it or the FTA may determine to be appropriate, including, but not limited to:

1. Withholding of payments to the Contractor under the Contract until the Contractor complies, and/or,

2. Cancellation, termination or suspension of the Contract, in whole or in part.

E. Incorporation of Provisions

The Contractor shall include the provisions of paragraphs A through E of this section in every subcontract, including procurements of materials and leases of equipment, unless exempt by the regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the County or the FTA may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that, in the event the Contractor becomes involved in or is threatened with litigation with a subcontractor or supplier as a result of such direction, the Contractor may request the County to enter into such litigation to protect the interests of the County, and in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

6-6 Labor Provisions - Non-Construction Contracts

A. Overtime Requirements

No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to work in excess of forty (40) hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half (1.5) times the basic rate of pay for all hours worked in excess of forty (40) hours in such work week. (29 CFR § 5.5(b)(1)).

B. Violation: Liability for Unpaid Wages: Liquidated Damages

In the event of any violation of the clause set forth in paragraph A of this section, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such district or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of paragraph A of this section in the sum of ten ($10) dollars for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty (40) hours without payment of the overtime wages required by paragraph A of this section. (29 CFR § 5.5(b)(2)).

C. Withholding for Unpaid Wages and Liquidated Damages

The Department of Transportation or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be

determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in paragraph B of this section. (29 CFR § 5.5(b)(3)))

D. Payrolls and Basic Records

The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three (3) years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made and actual wages paid. Further, the records to be maintained under this paragraph shall be made available by the Contractor or subcontractor for inspection, copying or transcription by authorized representatives of the Department of Transportation and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job. (29 CFR § 5.5(c)).

E. Subcontracts

The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs A through E of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs A through E of this section. (29 CFR § 5.5(b)(4)).

6-7 Cargo Preference - Use of U.S. Flag Vessels or Air Carriers

In the event that ocean shipment or international air transportation is required for any equipment, material or commodities pursuant to this Contract, the Contractor shall:

A. Utilize privately owned United States-flag commercial vessels to ship at least fifty (50%) percent of the gross tonnage involved, computed separately for dry bulk carriers, dry cargo liners and tankers, whenever shipping any equipment, materials or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

B. Furnish within twenty (20) working days following the date of loading for shipments originating within the United States, or within thirty (30) working days following the date of loading for shipment originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph A of this section, to the County, through the prime Contractor in the case of subcontractor bills-of-lading, and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590, marked with appropriate identification of the project.

C. Utilize United States flag air carriers to the extent such carriers provide the air transportation needed, or accomplish the Contractor’s mission. The Contractor agrees to utilize United States flag air carriers even though comparable or a different kind of service can be provided at less cost by a foreign air carrier, a foreign air carrier is preferred by or more convenient for the Contractor, or service by a foreign air carrier can be paid for in excess foreign currency, unless United States flag air carriers decline to accept excess or near excess foreign currencies for transportation payable only out of those monies.

D. Insert the substance of the provisions of this section in all subcontracts issued pursuant to this Contract.

(Required by 46 CFR Part 381 and 41 CFR Part 301-3.6).

6-8 Audit and Inspection of Records

In the case of all negotiated contracts and contracts for construction, reconstruction or improvement of facilities and equipment, which were entered into under other than competitive proposal procedures, Contractor agrees that the County, the Comptroller General of the United States or any of their duly authorized representatives, shall, for the purpose of audit and examination be permitted to inspect all work, materials, payrolls, and other data and records with regard to the project, and to audit the books, records and accounts with regard to the project. Further, Contractor agrees to maintain all required records for at least three (3) years after the County makes final payment and all other pending matters are closed.

6-9 Buy America

The Contractor agrees to comply with 49 USC §5323(j), 49 CFR Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver.

General waivers are listed in 49 CFR 661.7 and include but are not limited to final assembly in the United States for microcomputer equipment, software, and small purchases (currently less than $100,000) made with capital, operating, or planning funds. Separate requirements for rolling stock are set out at 5323(j)(2)(C) and 49 CFR 661.11.

Proposals in excess of $100,000 require Attachment H, "Buy America" Certificate, be completed and submitted to the County with the proposal, except those subject to a general waiver. Proposals that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

6-10 FTA Protest Procedures

Proposers are hereby notified that if this Contract is funded in whole or in part by the Federal Department of Transportation, the Federal Transit Administration (FTA) may entertain a protest that alleges that the County failed to have or follow written protest procedures. Proposers must file a protest with the FTA not later than 5 working days after the County renders a final decision or 5 working days after the Proposer knows or has reason to know that the County has failed to render a final decision. The protesting party must notify the County if it has filed a protest with the FTA. After 5 days, the County will confirm with FTA that FTA has not received a protest. Protests to the FTA must be filed in accordance with FTA Circular 4220.1D (as periodically updated).

The County will not award a contract for 5 working days following its decision on a Proposal protest or while a protest to the FTA is pending unless the County determines that: (1) the items to be procured are urgently required; (2) delivery of performance will be unduly delayed by failure to make the award promptly; or (3) failure to make prompt award will otherwise cause undue harm to the County or the Federal Government.

6-11 Privacy

Should the Contractor, or any of its subcontractors, or their employees administer any system of records on behalf of the Federal Government, the Privacy Act of 1974, 5 USC § 552a, imposes information restrictions on the party administering the system of records.

For purposes of the Privacy Act, when the Agreement involves the operation of a system of records on individuals to accomplish a government function, the recipient and any contractors, third party contractors, subcontractors and their employees involved therein are considered to be government employees with respect to the government function. The requirements of the Act, including the civil and criminal penalties for violations of the Act, apply to those individuals involved. Failure to comply with the terms of the Act or this provision of this contract will make this contract subject to termination.

The Contractor agrees to include this clause in all subcontracts awarded under this Contract that involve the design, development, operation, or maintenance of any system of records on individuals subject to the Act.

6-12 Access Requirements for Individuals with Disabilities

The County and contractors are required to comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA), 42 USC §§ 12101, *et seq.*; Section 504 of the Rehabilitation Act of 1973, as amended, 29 USC § 794; and 49 USC § 5301(d), and the following regulations and any amendments thereto:

A. U.S. Department of Transportation regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 CFR Part 37;

B. U.S. Department of Transportation regulations, "Nondiscrimination on the Basis of Handicap in Programs and Activities receiving or benefiting from Federal Financial Assistance," 49 CFR Part 27;

C. U.S. Department of Transportation regulations, "Americans With Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 49 CFR Part 38;

D. U.S. Department of Justice (DOJ) regulations, "Nondiscrimination on the Basis of Disability in State of Local Government Services," 28 CFR Part 35;

E. U.S. Department of Justice regulations, "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities," 28 CFR Part 36;

F. U.S. General Services Administration regulations, "Accommodations for the Physically Handicapped," 41 CFR Subpart 101-19;

G. U.S. Equal Employment Opportunity Commission (EE0C) "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630;

H. U.S. Federal Communications Commission regulations, "Telecommunications Relay Services and Related Customer Premises Equipment for the Hearing and Speech Disabled," 47 CFR Part 64, Subpart F; and

I. FTA regulations, "Transportation for Elderly and Handicapped Persons," 49 CFR Part 609.

6-13 Interest of Members of or Delegates of Congress

Pursuant to 41 USC § 22, no member of or delegate to the Congress of the United States shall be admitted to any share or part of this Contract or to any benefit arising therefrom.

6-14 Certification Regarding Debarment, Suspension and Other Responsibility Matters

Pursuant to Executive Order 12549 and 12689, "Debarment and Suspension," 31 USC § 6101 note and federal regulations in 49 CFR 29, entities and individuals who are debarred or suspended by the federal government are excluded from obtaining federal assistance funds under this contract. To assure that such entities and individuals are not involved as participants on this FTA-financed contract, if the contract exceeds $100,000, each Proposer shall complete and submit, as part of its Proposal, the certification contained in Attachment K for itself, its principals and its subcontractor(s) for any subcontract in excess of $100,000. The inability of a Proposer to provide a certification in Attachment K will not necessarily result in denial of consideration for contract award. A Proposer that is unable to provide a certification must submit a complete explanation attached to the certification form. Failure to submit a certification or explanation shall disqualify the Proposer from participation under this Proposal. The County, in conjunction with FTA, will consider the certification or explanation in determining contract award. No contract will be awarded to a potential third-party contractor submitting a conditioned debarment or suspension certification, unless approved by the FTA.

The certification is a material representation of fact upon which reliance is placed in determination of award of contract. If at any time the Proposer or Contractor learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances, it shall immediately provide written notice to the County. If it is later determined that the Proposer knowingly rendered an erroneous certification, or failed to notify the County immediately of circumstances which made the original certification no longer valid, the County may disqualify the Proposer. If it is later determined that the Contractor knowingly rendered an erroneous certification, or failed to notify the County immediately of circumstances which made the original certification no longer valid, the County may terminate the contract, in addition to other remedies available including FTA suspension and/or debarment.

6-15 Subcontractors' Certification Regarding Debarment, Suspension or Ineligibility

By submitting a Proposal for this Contract, the Proposer agrees that should it be awarded the Contract, it shall not knowingly enter into any subcontract exceeding $100,000 with an entity or person who is debarred, suspended, or who has been declared ineligible from obtaining federal assistance funds; and shall require each subcontractor to complete the certification provided in Attachment L.

Each subcontract, regardless of tier, shall contain a provision that the subcontractor shall not knowingly enter into any lower tier subcontract with a person or entity who is debarred, suspended or declared ineligible from obtaining federal assistance funds, and a provision requiring each lower-tiered subcontractor to provide the certification set forth in Attachment L.

The Contractor shall require each subcontractor, regardless of tier, to immediately provide written notice to the Contractor if at any time the subcontractor learns that its, or a lower-tier certification was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor may rely upon the certifications of the subcontractors unless it knows that a certification is erroneous. The Contractor's knowledge and information regarding any subcontractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business.

6-16 Disclosure of Lobbying Activities

Proposals in excess of $100,000 require Attachment I, "Certification Regarding Lobbying," and Attachment J, "Disclosure of Lobbying Activities" (if appropriate), be completed and submitted to the County with the proposal, as required by 49 CFR Part 20, "New Restrictions on Lobbying."

The Contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by the Byrd Anti-Lobbying Amendment,

31 USC § 1352. The Contractor shall disclose the name of any registrant under the Lobbying Disclosure *et seq.*, who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 USC § 1352. Such disclosures are to be forwarded to the County.

The Contractor will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

6-17 Anti-Kickback

The County and contractors are required to comply with the Anti-Kickback Act of 1986, 41 USC §§ 51 *et seq.* Under state and federal law, it is a violation for County employees, proposers, contractors or subcontractors to accept or offer any money or benefit as a reward for favorable treatment in connection with the award of a contract or the purchase of goods or services.

"Kickback" as defined by Federal Acquisition Regulation (FAR) 52.203-7, and 41 USC § 52(2), means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind that is provided directly or indirectly to any prime Contractor, prime Contractor employee, subcontractor or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

6-18 False or Fraudulent Statements or Claims

The Contractor acknowledges that if it makes a false, fictitious, or fraudulent claim, statement, submission, or certification to the County in connection with this project, the County reserves the right to pursue the procedures and impose on the recipient the penalties of 18 USC § 1001, 31 USC §§ 3729 and 3801 *et seq.*, and/or 49 USC § 5307(n)(1), as may be appropriate. The terms of Department of Transportation regulations, "Program Fraud Civil Remedies," 49 CFR Part 31, are applicable to this project.

The Contractor agrees to include this clause in all subcontracts awarded under this Contract.

6-19 Conservation

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the State Energy Conservation plan issued in compliance with the Energy Policy and Conservation Act, 42 USC §§ 6321 *et seq.*

The Contractor agrees to include this clause in all subcontracts awarded under this Contract.

6-20 Air Pollution

The Contractor and suppliers may be required to submit evidence to the project manager that the governing air pollution criteria will be met. This evidence and related documents will be retained by the manager for on-site examination by FTA.

6-21 Environmental Requirements

The Contractor agrees to comply with all applicable standards, orders or requirements as follows:

A. Environmental Protection

The Contractor agrees to comply with the applicable requirements of the National Environmental Policy Act of 1969, as amended, 42 USC §§ 4321, *et seq.*, consistent with Executive Order No.

11514, as amended, "Protection and Enhancement of Environmental Quality," 42 USC § 4321 note. FTA statutory requirements on environmental matters at 49 USC § 5324(b); Council on Environmental Quality regulations on compliance with the National Environmental Policy Act of 1969, as amended, 42 USC § 4321 *et seq.* and 40 CFR Part 1500, *et seq.*; and joint FHWA/FTA regulations, "Environmental Impact and Related Procedures," 23 CFR Part 771 and 49 CFR Part 622.

B. Air Quality

The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42 USC §§ 7401, *et seq.* The Contractor agrees to report each violation to the County and understands and agrees that the County will, in turn, report each violation as required to assure notification to FTA and the appropriate Environmental Protection Agency (EPA) Regional Office.

The Contractor agrees to include this clause in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

C. Clean Water

The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 USC §§ 1251 *et seq*. The Contractor agrees to report each violation to the County and understands and agrees that the County will, in turn, report each violation as required to assure notification to FTA and the appropriate Environmental Protection Agency (EPA) Regional Office.

The Contractor agrees to protect underground sources of drinking water consistent with the provisions of the Safe Drinking Water Act of 1974, as amended, 42 USC §§ 300h *et seq.*

The Contractor agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

D. Use of Public Lands

The Contractor agrees that no publicly owned land from a park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance as determined by the federal, state or local officials having jurisdiction thereof, or any land from a historic site of national, state, or local significance may be used for the Project unless the FTA makes the specific findings required by 49 USC § 303.

E. Historic Preservation

The Contractor agrees to assist the Federal Government in complying with section 106 of the National Historic Preservation Act, as amended, 16 USC § 470f, Executive Order No. 11593, "Protection and Enhancement of the Cultural Environment," 16 USC § 470 note, and the Archaeological and Historic Preservation Act of 1974, as amended, 16 USC §§ 469a-1 *et seq.* involving historic and archaeological preservation as follows:

1. The Contractor agrees to consult with the State Historic Preservation Officer about investigations to identify properties and resources listed in or eligible for inclusion in the National Register of Historic Places that may be affected by the Project, in accordance with Advisory Council on Historic Preservation regulations, "Protection of Historic and Cultural Properties," 36 CFR Part 800, and notifying FTA of those properties so affected.

2. The Contractor agrees to comply with all federal requirements to avoid or mitigate adverse effects on those historic properties.

F. Mitigation of Adverse Environmental Effects

The Contractor agrees that if the Project should cause adverse environmental effects, the Contractor will take all reasonable steps to minimize those effects in accordance with 49 USC § 5324(b), and all other applicable federal laws and regulations, specifically, the procedures of 23 CFR Part 771 and 49 CFR Part 622.

G. Energy Conservation

The Contractor agrees to comply with the mandatory energy efficiency standards and policies within the applicable state energy conservation plans issued in compliance with the Energy Policy and Conservation Act, 42 USC §§ 6321, *et seq.*

6-22 Preference for Recycled Products

To the extent practicable and economically feasible, the Contractor agrees to provide a competitive preference for products and services that conserve natural resources and protect the environment and are energy efficient. Examples of such products may include, but are not limited to, products described in the United States EPA Guidelines at 40 CFR Part 247, implementing section 6002 of the Resource Conservation and Recovery Act, as amended, 42 USC § 6962, and Executive Order 12873.

6-23 Patent Rights (Not Used)

6-24 Rights in Data and Copyrights (Not Used)

6-25 Termination Provisions Required

All contracts and subcontracts in excess of $10,000 shall contain contractual provisions or conditions that allow for termination for cause and convenience by the County including the manner by which it will be effected and the basis for settlement.

(Required by FTA Circular 4220.1D, § 15.b.).

6-26 Breach Provisions Required

All contracts in excess of $100,000 shall contain contractual provisions or conditions that will allow for administrative, contractual, or legal remedies in instances where the Contractor violates or breaches the terms of this Contract, including sanctions and penalties as may be appropriate. The Contractor agrees to include this provisional requirement in all subcontracts in excess of $100,000 awarded under this Contract.

(Required by FTA Circular 4220.1D, § 15.a.).

6-27 Incorporation of FTA Terms

The preceding provisions include, in part, certain Standard Terms and Conditions required by the U.S. Department of Transportation, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by the U.S. Department of Transportation, as set forth in FTA Circular 4220.1D, dated April 15, 1996, are hereby incorporated by reference. Anything to the contrary herein

notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Contract. The Contractor agrees not to perform any act, fail to perform any act, or refuse to comply with any County requests that would cause the County to be in violation of the FTA terms and conditions.

PART A: SECTION 7- PROPOSAL QUESTIONS~~PROPOSAL EVALUATION CRITERIA~~ REQUIREMENTS

7-1 General

This section contains the Proposal questions to be addressed by Proposers. Proposals shall address the questions in the order presented identifying the proposal questions by number. Proposals need to be specific, detailed and straight forward using clear, concise, easily understood language.

Proposers answering the proposal questions shall examine the entire Request for Proposal document including the instructions, terms and conditions, specifications and applicable standards and regulations. Failure to do so shall be at the proposers risk.

7-2 Management Requirements

A. Company Profile

1. Background and history: Describe the company, its age, organization, officers or partner, number of employees, product specification and operating policies which would effect this contract. State the number of years your organization has been engaged in the business of designing and marketing traction power substation equipment for trolley overhead systems. When, where by whom and for what purpose were the proposed systems originally developed.

2. Sales and Support Office: Identify the office that would be responsible for the sales and support services to be provided in the Seattle area. Include the number of personnel based at this location and their experience with traction power substation equipment.

B. Experience

1. Describe the company's length of time in business producing successful transit traction power substations similar to that required by Metro.

2. Describe the company's experience in designing and providing all phases of traction power substation including inspection, testing, commissioning and services.

3. Describe the company's successful long term operating experience with DC transit systems.

4. Provide qualifications of design and development personnel.

C. Delivery

Provide information regarding timely delivery of substations for similar contracts.

D. Quality and Similarity of System

Describe the quality and similarity of your systems to Metro's proposed traction power substation.

E. Financial Resources

Describe the financial status of the company. Attach a Dunn and Bradstreet Report and an audited financial statement.

F. Project Organization

List the experience of the principal individuals of your organization, including the persons you expect to assign to this contract.

G. Proposers Previous Traction Power Substation Equipment

1. List the name(s) of all transit properties who are currently using the proposed equipment.

The client list shall include:

- The name, address and telephone number of the transit property.
- The name of the individual in the transit property most knowledgeable about the proposed system.
- The date of the installation.

H. Completion of a Contract Award

Has your company ever failed to complete any awarded contract?

7-3 Technical Requirements

A. Warranties and Guarantees

Describe how you will provide service under the contract guarantee requirements.

B. Implementation/Project Schedule

Provide a bar chart schedule showing all phases of the project. Include milestones for submittals as specified in the Section 16010-1.10 and delivery and completion as specified in the Section 01010-1.2, all test, and training.

C. Covenants or Restrictions

List any covenants or restrictions which would apply to the purchase, or use of the proposed equipment.

D. Quality Control

1. Submit the Company's Quality Control Plan, or provide answers to the following questions:

1.1 Organization chart with all persons responsible for quality control.

1.2 Inspection procedures.

1.3 Methods of identifying and correcting problems.

1.4 Documentation procedures.

1.5 Quality control of suppliers and subcontractors.

E. List all specifications sections for which proposal is not fully compliant. Explain in detail.

7-4 Configuration of Substation

Include in your responses equipment design and configuration and presentation of drawings and manuals (translations, symbols, layouts).

A. Describe major equipment configuration, design and components quality.

B. Describe subsystem configuration, design and component quality.

C. Provide layout of major equipment.

D. Describe requirements for erection of equipment.

E. Provide dimensional drawing showing proposed equipment layout for traction power substation

7-5 Transportation

Describe transportation of equipment and provide comments on shipping requirements of section 16010-1.3.

7-6 Maintainability

A. Provide recommended inspection and maintenance schedule for all equipment.

B. Provide information on availability of Parts. Provide telephone contact number for sources of parts for major equipment items.

C. Provide a list of required spare parts, quantities, and unit prices as required in the specification sections 16325, 2.4; 16345, 2.8; 16347, 2.9; 16362, 2.3, 16385, 2.5 and 16728, 2.5. The total prices is to be included in the proposal price on Attachment B1. The required spare parts will be evaluated as part of the total proposal price.

D. Provide a list of required special tools, test equipment, accessories and devices, quantities, unit price as specified in Section 16150, Paragraph 2.3. The total price is to be included in the total proposal price on Attachment B1. These required materials will be evaluated as apart of the total proposal price.

E. Provide a list of optional spare parts, quantities and unit prices of manufacturer recommended spare parts, per Section 16150-2.4. The total price is to be submitted on Attachment B1. The optional spare parts will not be evaluated as part of the total proposal price.

7-7 Equipment Description

A. Summary of salient traction power substation equipment features.

B. System Description: A narrative description of each of the automated functions.

C. AC Switchgear: A description of the built in features, components integrity, personnel safety features and examples of the major benefits of the system.

D. Conversion: A description of all the equipment features including charts and tables showing equipment rating for KW losses, dielectric and BIL ratings and sound levels.

E. DC Switchgear: A description of equipment construction, ratings, systems application, and dimensions and weights.

F. Security features: Explain features available to provide and restrict access to equipment and components.

7-8 Warranty Service

Warranty Service: Explain fully your plan for providing warranty service for the proposed equipment. The explanation should include:

1. Who will perform the service.
2. Response time for service.
3. Location from which service will be provided.

7-9 Proposed System Testing Plan

List location and test laboratory of facility (if any) for each specified test.

7-10 Training

Provide comments on the training requirements in the specifications.

7-11 Comments

Provide comments you feel will improve the technical specifications. This will not be included in the evaluation process.

ATTACHMENT A

PROPOSAL RESPONSE FORM

RFP NO: 00-034

Proposer's Declarations and Statement of Understanding

The undersigned (hereinafter called the "Proposer") declares that he/she has read the RFP and has authority to submit the following Proposal. The Proposer understands that, in addition to this Proposal Response Form, the RFP and Proposer's supporting documents constitute parts of the Proposal and are incorporated herein by reference. Proposer acknowledges that addenda numbers _____ through _____ have been delivered and have been taken into account as part of this Proposal, and that all addenda issued are hereby made part of our Proposal.

Proposer hereby designates _____, Telephone No:_____
as the person to contact for additional information about our Proposal.

E-Mail Address: _____ Fax No: _____

DECLARATION

By signing this Proposal, I hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. The undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this Proposal is submitted.

2. By signing the signature page of this Proposal, the undersigned business organization is deemed to have signed and agreed to the provisions of this declaration, and authorized the signature below.

3. In preparing this Proposal, the Proposer has not been assisted by any current or former employee of the County whose duties relate now or have related in the past to this Proposal or prospective agreement, and who was assisting in other than his or her official public capacity. Neither does such a person nor any member of his or her immediate family have any financial interest in the outcome of this Proposal. Any exceptions to these assurances are described in full detail on a separate page and attached to this Proposal Response Form.

Internal Revenue Service (IRS) Reporting Requirements

Check one: ☐ Corporation; ☐ Partnership; ☐ Sole Proprietor; ☐ Other _____

Identify: State of Incorporation: _____

Provide one: Federal Tax Number _____ Social Security Number _____

Identify: UBI Number _____ Business License Number _____

What is the official name registered with the IRS for this number: _____

[ ] Proposer accepts all Contractual terms and conditions.

[ ] Proposer does not accept all contractual terms

Firm Name: _____

Address: _____

and conditions. Explanation must be included with proposal and may impact vendor selection.

City, State, Zip: _____

Phone Number: _____

Authorized Signature: _____

Printed Name: _____

ATTACHMENT B

PRICE PROPOSAL FOR RFP NO. 00-034

SUPPLY AND DELIVERY OF TWO DC TRACTION POWER SUBSTATIONS

The undersigned Proposer hereby agrees to furnish and install the equipment and provide the services in accordance with the specifications and addenda issued under the above RFP.

Item	Quantity	Description	Total
1.	2	DC Traction Power Substation per the equipment list (Attachment B1)*	_____

*Price to include 120 hours of installation supervision.

Note:
The total traction power substation equipment cost shall include the total base price for design, fabrication, integration, factory testing, freight, installation supervision, field test, and integration test.

This price form must accompany the proposal.

Include this form in section two of your proposal along with **SCHEDULE A**.

_____
Name of Individual, Partner or Corporation

_____
Authorized Signature

_____
Title

RFP # 00-034
ATTACHMENT B1

Proposers are to submit Attachment B1 in accordance with Section 1-10, Instruction For Proposal Preparation.

EQUIPMENT LIST

Item No.	Description	Quantity Required	Unit Price	Total Price
1.	Transformer-Rectifier Unit, 1500kW, for medium traction service per NEMA RI-9, ANSI C34.2 circuit no. 31, including spare parts per Section 16325, 2.4A.	2	$_____	$_____
2.	AC Switchgear, 26.4kV, with one AC circuit breaker, complete with instrument transformers, controls, meters and other necessary devices, including spare parts per Section 16345, 2.8	2	$_____	$_____
3.	AC Disconnect Switch, 26.4kV, 600A, motor operated, load break, complete with accessories, including spare parts per 16360, 2.05.	3	$_____	$_____
4.	DC Switchgear, 700V DC with **one** semi-high speed circuit breaker rated 4000A and **six** semi-high speed circuit breakers each rated 2000A, complete with instruments, controls, meters, and other necessary devices, including spare parts per 16347, 2.9.	1	$_____	$_____
5.	DC Switchgear, 700V DC with **two** semi-high speed circuit breakers each rated 4000A and **six** semi-high speed circuit breakers each rated 2000A, complete with instruments, controls, meters, and other necessary devices, including spare parts per 16347, 2.9.	1	$_____	$_____
6.	Negative Enclosure, complete with one negative disconnect switch, rated 4000A with controls, instruments, and other necessary devices.	2	$_____	$_____

7. DC Disconnect Switch Assembly, 700 V DC, with **six** Feeder Disconnect Switches, each rated 2000A, including spare parts per Section 16362, 2.3.	2	$_____	$_____
8. Annunciator Panel, including spare parts identified in Section 16728, 2.5 A.3 and A.4.	1	$_____	$_____
9. ITC Cabinet with SCADA RTU including spare parts identified in Section 16728, 2.5, A.1 and A.2	1	$_____	$_____
10. Substation Enclosure	1	$_____	$_____
11. Station Service Equipment	1	$_____	$_____
12. Battery System including spare parts per Section 16385, 2.5 A.2 and A.3.	1	$_____	$_____
13. Testing of Traction Power Substation per Section 16950 (Lump Sum) except for Assembled Substation Short Circuit Test.	1	$_____	$_____
14. Assembled Substation Short Circuit Test.	1	$_____	$_____
15. Miscellaneous Items, including Special Tools, Training, Operations and Maintenance Manuals (Lump Sum)	1	$_____	$_____
16. Installation Supervision:	120 hours	$_____/hour	$_____
TOTAL PROPOSAL PRICE			$_____
Contractor recommended spare parts per Section 16150, 2.4.	Lot		$_____
Storage at Contractor's Facility per Section 16101, 1.3.A.3			$_____/week

ATTACHMENT C

Personnel Inventory Report

Legal name of business_____ Telephone No: _____

dba (if applicable)_____

Street address_____City_____State_____Zip Code_____

Submitted by:_____ Title _____ Date _____

IRS Employer Identification Number: _____

Do you have any employees? No ___Yes___

If yes, list on the Employment Data Chart below the total number of employees for all businesses located in (1) King County. If none, list the total number of employees for all businesses located in (2) Washington State. If none, list the total number of employees for all businesses located in the (3) United States. Indicate which locale (1,2,3) report covers_____. This report covers Business Location(s) in (circle one): [King County, Washington State, Other States] for the Payroll Period ending (Month/Day/Year):_____.

Do any of your employees belong to a union and/or do you use an employee referral agency? No____Yes____

If yes, list the unions and/or employee referral agencies with whom you have agreements: _____. If you expect to do more than $10,000 worth of public work (construction) or, more than $25,000 worth of business with King County, the unions or employee referral agencies must submit a statement of compliance with King County Code Chapter 12.16.

Job Categories	Whites		African Americans		Asians		Native Americans		Hispanics		Disabled		Minority Subtotal		Disabled Subtotal	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

* Journey worker: List by classification on reverse, e.g., carpenter, plumber, etc.

Total number of employees reported above: _____ If no employees, write "0."

Personnel Inventory Report

SUPPLEMENTAL FORM

Use this form as necessary to report the total work force.

Legal name of business_____Telephone_____
Submitted by: _____ Title _____ Date _____

Job Categories	Whites		African Americans		Asians		Native Americans		Hispanics		Disabled		Minority Subtotal		Disabled Subtotal	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Managerial																
Professional																
Technical																
Clerical																
Sales																
Service																
Labor																
On-Job Trainees																
Apprentice																
Skilled Craft*																
Subtotal																

Contact the King County Procurement and Contract Services Division at (206) 296-4210 or the King County M/WBE and Contract Compliance Division (206) 684-1330 if you have any questions concerning completion of this form.

ATTACHMENT D

PERFORMANCE AND PAYMENT BOND
RFP NO. 00-034

KNOW ALL BY THESE PRESENTS: That we, _____ _____, as Principal, and _____ as Surety, are held and firmly bound unto King County in the full sum of _____ _____ Dollars ($_____), lawful money of the United States, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, The conditions of this obligation are such that the Principal has entered into a contract in writing with King County for: _____ and the terms, conditions and covenants specified in said contract, including all of the contract documents, as amended and modified, therein referred to, are hereby referred to and made a part hereof as fully and completely as though set forth in detail herein;

NOW, THEREFORE, if the Principal shall faithfully perform all the provisions and requirements of the contract, including all of the contract documents, according to the terms and conditions thereof and shall hold the County harmless from any loss, or damage to any person or property by reason of any negligence on the part of the Principal or of any subcontractor in the performance of said work, and shall pay all laborers, mechanics, subcontractors and materialmen and all persons who shall supply such person or subcontractors with provisions and supplies for carrying on of such work, and shall pay the State of Washington all amounts due said State pursuant to Titles 50 and 51 of the Revised Code of Washington, and shall further indemnify and save harmless the County from any defect or defects in any of the workmanship or materials entering into any part of the work as defined in the contract which shall develop or be discovered within the time set forth in the contract, then this obligation shall be null and void; otherwise to remain in full force and effect, and the County shall have the right to sue on this bond for any breach of the Contract or this bond.

IT IS FURTHER DECLARED AND AGREED that nothing of any kind or nature whatsoever that will not discharge the Principal shall operate as a discharge or a release of liability of the Surety, any law, rule of equity or usage relating to the liability of sureties to the contrary notwithstanding, and the Surety waives notice of any alteration, or extension of time, made by the County and agrees that it, the Surety, shall be bound in all ways to the County for any such alterations or extensions of time as if it had received notice of the same.

Signed and sealed this _____ day of _____, 20____.

Principal: _____	Surety: _____
By: _____	By: _____
Title: _____	Title: _____
Address: _____	Address: _____
City/Zip: _____	City/Zip: _____
Telephone: (____)_____	Telephone: (____)_____

Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this Performance and Payment Bond.

ATTACHMENT E

Affidavit and Certificate of Compliance

with King County Code Chapter 12.16, Discrimination and Affirmative Action in Employment by Contractors, Subcontractors and Vendors

The undersigned, being first duly sworn, on oath states, s/he is authorized by the Contractor, and on the Contractor's behalf, affirms and certifies as follows:

Definitions: "Contractor" shall mean any contractor, vendor or Contractor who supplies goods and/or services. "Contract" shall mean any contract, purchase order or agreement with King County Government, hereinafter called the County.

A. Contractor recognizes that discrimination in employment is prohibited by federal, state and local laws. Contractor recognizes that in addition to refraining from discrimination, affirmative action is required to provide equal employment opportunity. Contractor further recognizes that this Affidavit establishes minimum requirements for affirmative action and fair employment practices and implements the basic nondiscrimination provisions of the general contract specifications as applied to service, Contractor, and vendor contracts exceeding $25,000, or public work contracts exceeding $10,000. Contractor herein agrees that this Affidavit is incorporated as an addendum to its general contract, and recognizes that failure to comply with these requirements may constitute grounds for application of sanctions as set forth in the general specifications, King County Code Chapter 12.16 ("Chapter") and this Affidavit. PROVIDED FURTHER, that in lieu of this Affidavit, the Executive may accept a statement pledging adherence to an existing contractor affirmative action plan where the provisions of the plan are found by the Executive to substantially fulfill the requirements of the Chapter.

B. Contractor shall give notice to their supervisors and employees of the requirements for affirmative action to be undertaken prior to the commencement of work.

C. This person has been designated to represent the Contractor and to be responsible for securing compliance with and for reporting on the affirmative actions taken:

_____.

D. Contractor will cooperate fully the M/WBE and Contract Compliance Division and appropriate County agents while making every reasonable "good faith" effort to comply with the affirmative action and nondiscrimination requirements set forth in this Affidavit and in King County Code Chapter 12.16.

E. **Reports:** The Contractor agrees to complete and submit as required such additional reports and records that may be necessary to determine compliance with the Affidavit and to confer with the County Compliance Officer at such times as the County shall deem necessary. The information required by the Chapter includes but is not limited to the following reports and records:

1. **Personnel Inventory Report:** This report shall include a breakdown of the employer workforce showing race, sex and handicapped and other minority data.
2. **Monthly Utilization Report:** This report shall apply to construction contractors and subcontractors and shall provide the number of hours of employment for all employees, including minority, women and disabled employees by craft and category.
3. **Statement from Union or Worker Referral Agency:** This statement affirms that the signee's organization has no practices and policies which discriminate on the basis of race, color, creed, religion, sex, age, marital status, sexual orientation, nationality or the presence of sensory, mental or physical disability.

The information required in this section shall be submitted on forms provided by the County unless otherwise specified.

F. **Subcontractors:** For public works projects and contracts over ten thousand dollars ($10,000) the prime contractor shall be required to submit to the County, along with its qualifying documents under the Chapter, employment profiles, Affidavits and Certificates of Compliance, Reports and Union Statements from its subcontractors in the same manner as these are required of the prime contractor. Reporting requirements of the prime contractor during the contract period will apply equally to all subcontractors.

G. **Employment Goals for Minorities, Women and Persons with Disabilities:** No specific levels of utilization of minorities and women in the workforce of the Contractor shall be required, and the Contractor is not required to grant any preferential treatment on the basis of race, sex, color, ethnicity or national origin in its employment practices. Notwithstanding the foregoing, any affirmative action requirements set forth in any federal regulations, statutes or rules included or referenced in the contract documents shall continue to apply.

H. **Affirmative Action Measures:** Contractor agrees to implement and/or maintain reasonable good faith efforts to comply with King County Code Chapter 12.16. The evaluation of a contractor's compliance with the Chapter shall be based upon the contractor's effort to achieve maximum results from its affirmative action measures. The Contractor shall document these efforts and shall implement affirmative action steps at least as extensive as the following:

1. **Policy Dissemination:** Internal and external dissemination of the contractor's equal employment opportunity policy; posting of nondiscrimination policies and of the requirement of the Chapter on bulletin boards clearly visible to all employees; notification to each subcontractor, labor union or representative of workers with which there is

a collective bargaining agreement or other contract, subcontract, or understanding of the contractor's commitments under the Chapter. Inclusion of the equal opportunity policy in advertising in the news media and elsewhere.

2. **Recruiting:** Adopt and implement recruitment procedures designed to increase the representation of women, minorities and persons with disabilities in the pool of applicants for employment: including, but not limited to establishing and maintaining a current list of minority, women and disabled recruitment sources, providing these sources written notification of employment opportunities and advertising vacant positions in newspapers and periodicals which have minority, women and/or disabled readership.
3. **Self-Assessment and Test Validation:** Review of all employment policies and procedures, including tests, recruitment, hiring and training practices and policies, performance evaluations, seniority policies and practices, job classifications and job assignments to assure that they do not discriminate against, or have a discriminatory impact on, minorities, women and persons with disabilities and validate all tests and other selection requirements where there is an obligation to do so under state or federal law.
4. **Record Referrals:** Maintain a current file of applications of each minority, women and persons with disabilities who are applicants or referrals for employment indicating what action was taken with respect to each such individual and the reasons therefor. Contact these people when an opening exists for which they may be qualified. Names may be removed from the file after twelve months have elapsed from their last application or referral.
5. **Notice to Unions:** Provide notice to labor unions of the contractor's nondiscrimination and affirmative action obligations pursuant to King County Code Chapter 12.16. Contractors shall also notify the M/WBE and Contract Compliance Division if labor unions fail to comply with the nondiscrimination or affirmative provisions.
6. **Supervisors:** Ensure that all supervisory personnel understand and are directed to adhere to and implement the nondiscrimination and affirmative action obligations of the contractor under King County Code Chapter 12.16. Such direction shall include, but not be limited to, adherence to, and achievement of, affirmative action policies in performance appraisals of supervisory personnel.
7. **Employee Training:** When reasonable, develop on-the-job training opportunities which expressly include minorities, women, and persons with disabilities and sponsor and/or utilize, training/educational opportunities for the advancement of women, minorities and persons with disabilities employed by the contractor, subject to acceptance by the county.
8. **Responsible Person:** Designate an employee who shall have the responsibility for implementation of the Contractor's affirmative action measures.
9. **Progress Reporting:** Prepare as part of the affirmative action plan an analysis and report on the progress made toward eliminating the underrepresentation of minorities, women, and persons with disabilities in the contractor's workforce on an annual basis.

I. During the performance of this Contract, neither the Contractor nor any party subcontracting under the authority of this Contract shall discriminate nor tolerate harassment on the basis of race, color, sex, religion, nationality, creed, marital status, sexual orientation, age, or the presence of any sensory, mental or physical disability in the employment or application for employment or in the administration or delivery of services or any other benefits under this Contract.

J. Contractor agrees to provide reasonable access upon request to the premises of all places of business and employment, relative to work undertaken in this Contract, and to records, files, information and employees in connection therewith, to the M/WBE and Contract Compliance Division or agent for purposes of reviewing compliance with the provisions of this Affidavit and agrees to cooperate in any compliance review.

K. Should the M/WBE and Contract Compliance Division find, upon complaint investigation or review, the Contractor not to be in good faith compliance with the provisions contained in this Affidavit, it shall notify the County and Contractor in writing of the finding fully describing the basis of non-compliance. Contractor may request withdrawal of such notice of noncompliance at such time as the compliance office has notified in writing the Contractor and the County that the noncompliance has been resolved.

L. The Contractor agrees that any violation of any term of this Affidavit, including reporting requirements, shall be deemed a violation of King County Code Chapter 12.16. Any such violation shall be further deemed a breach of a material provision of the Contract between the County and the Contractor. Such breach may be grounds for implementation of any sanctions provided for in the Chapter, including but not limited to, cancellation, termination or suspension, in whole or part, of the Contractor by the County; liquidated damages; or disqualification of the Contractor PROVIDED, that the implementation of any sanctions is subject to the notice and hearing provisions of King County Code Chapter 12.16.110.

Contractor: _____
Company Name Street Address City State Zip

I have read and understood the foregoing; and am authorized on behalf of the Contractor to agree to the terms and conditions of this and Affidavit and Certificate of Compliance and therefore, execute the same.

Authorized Signer:_____
Name (type or print) Title Phone Signature

VALID ONLY IF NOTARIZED

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____DAY OF _____, 2000.

_____
Signature of notary public)

_____
(Printed name of notary public)

Notary Public in and of the state of _____

My appointment expires:

_____

ATTACHMENT F

SWORN STATEMENT REGARDING DISADVANTAGED BUSINESS ENTERPRISE COMMITMENT
RFP NO. 00-034

STATE OF _____)
) ss.
COUNTY OF _____)

A. This Sworn Statement constitutes the Proposer's statement of its efforts to take all necessary and reasonable steps to ensure that Disadvantaged Business Enterprises have the maximum opportunity to participate in the performance of subcontracts and agreements hereunder. The Proposer also affirms that all documentation submitted herewith is true and accurate.

B. The Proposer hereby designates as the person who has been charged by the Proposer with the responsibility for carrying out and reporting the Proposer's compliance with the County's requirements for Disadvantaged Business Enterprises:

Name: _____
Title: _____

C. There may be few subcontracting opportunities for DBEs involved in the performance under this RFP. The County has not established a DBE participation goal. If the Proposer subcontracts any work under a contract awarded pursuant to this RFP, the Proposer shall make affirmative efforts to solicit and use DBEs.

D. Affirmative efforts shall include at a minimum that the following steps be taken prior to entering into any subcontract agreements:

1. Contact the County's Minority/Women Business Enterprise Division to explain the work to be subcontracted and to obtain a listing of DBEs which may be interested in performing such subcontract work;

2. Solicit Bids from such DBEs; and

3. Award subcontracts to such DBEs which provide reasonable Bids.

_____
Name of Bidder

By: _____

Title: _____

VALID ONLY IF NOTARIZED

SUBSCRIBED AND SWORN TO BEFORE ME THIS _____DAY OF _____, 2000.

_____
Signature of notary public)

_____
(Printed name of notary public)

Notary Public in and of the state of _____

My appointment expires:_____

ATTACHMENT G

CURRENT OR FORMER KING COUNTY EMPLOYEE DISCLOSURE FORM

RFP NO: 00-034

(Complete if applicable. If not, mark N/A "Not Applicable")

1. Identify current or former employees of the County involved in the preparation of this Proposal or the anticipated performance of the work or services to be provided on this contract.

   Name of current or former Employee: _____

   Date of Last Employment with the County: _____

2. The Contractor is responsible for notifying the County's project manager of current or former County employees who become involved in the contract any time during the term of the contract:

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

ATTACHMENT H-1

BUY AMERICA CERTIFICATE FOR ROLLING STOCK OR ASSOCIATED EQUIPMENT

RFP NO. 00-034

49 CFR CH. IV (10-1-90 Edition)

§ 661.12 CERTIFICATION REQUIREMENT FOR PROCUREMENT OF BUSES, OTHER ROLLING STOCK AND ASSOCIATED EQUIPMENT

If buses, or other rolling stock (including train control, communication and traction power equipment) are being procured, the appropriate certificate as set forth below shall be completed and submitted by each Proposer:

Section 165 of Public law 97-424
as revised by Section 337(b) of Public Law 100-17
and
Section 337(a)(1)(B) of Public Law 100-17

> Section 165(b). The provisions of subsection (a) of this section shall not apply where the secretary finds ". . . (3) in the case of the procurement of bus and other rolling stock (including train control, communication, and traction power equipment) under the Urban Mass Transportation Act of 1964, that (A) the cost of components and subcomponents which are produced in the United State is more than 60 per centum of the cost of all components of the vehicle or equipment described in this paragraph, and (B) final assembly of the vehicle or equipment described in this paragraph has taken place in the United States.

CERTIFICATE OF COMPLIANCE WITH SECTION 165(B)(3)

The Proposer hereby certifies that it will comply with the requirements of section 165(b)(3) of the Surface Transportation Assistance Act of 1982 and the regulations in 49 CFR 61.11.

Date: _____
Signature: _____
Title: _____
Company Name: _____

CERTIFICATE FOR NON-COMPLIANCE WITH SECTION 165 (B)(3)

The Proposer hereby certifies that it cannot comply with the requirements of section 165(b)(3) of the Surface Transportation Act of 1982, but may qualify for an exception to the requirement pursuant to section 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act and regulations in 49 CFR 661.7.

Date: _____
Signature: _____
Title: _____
Company Name: _____

(51 FR 22286, June 19, 1996)

ATTACHMENT I

CERTIFICATE OF LOBBYING ACTIVITIES

RFP NO: 00-034

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer of employee of any agency, a Member of Congress, or officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, grant, loan or cooperative agreement.

(2) If any funds other than Federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer of employee of any agency, a Member of Congress, an officer or employee of Congress or an employee or a Member of Congress in connection with this Federal contract, grant, loan or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants and contracts under grants, loans and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

ATTACHMENT J

Complete this form to disclose lobbying activities pursuant to 31 U.S. C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action: ☐ a. contract ☐ b. grant ☐ c. cooperative agreement ☐ d. loan ☐ e. loan guarantee ☐ f. loan insurance	2. Status of Federal Action: ☐ a. bid/offer/application ☐ b. initial award ☐ c. post-award	3. Report Type: ☐ a. initial filing ☐ b. material change For material change only: year_____ quarter_____ Date of last report:_____
4. Name and Address of Reporting Entity: ☐ Prime ☐ Subawardee Tier_____, if known: Congressional District, if known:		5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime: Congressional District, if known:
6. Federal Department/Agency:		7. Federal Program Name/Description: CFDA Number, if applicable: _____
8. Federal Action Number, if known:		9. Award Amount, if known: $
10. a. Name and Address of Lobbying Entity (If individual, last name, first name, MI):		b. Individuals Performing Services (including address if different from No. 10a) (Last name, First name, MI):
11. Amount of Payment (check all that apply):		13. Type of Payment (check all that apply): ☐ a. retainer ☐ b. one-time fee ☐ c. commission ☐ d. contingent fee ☐ e. deferred ☐ f. other; specify: _____
12. Form of Payment (check all that apply): ☐ a. cash ☐ b. in kind; specify: nature _____ value _____		
14. Brief Description of Services Performed or to be Performed and date(s) of service, including officer(s), employee(s), or member(s) contacted, for payment indicated in Item 11: (Attach Continuation Sheet(s) SF-LLL-A, if necessary)		
15. Continuation Sheet(s) SF-LLL-A attached): ☐ Yes ☐ No		
16. Information requested through this form is authorized by title 31 USC § 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 USC § 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.		Signature:_____ Print Name:_____ Title: _____ Telephone No: _____ Date: _____

ATTACHMENT J

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing to title 31 USC section 1352. The filing of a form is required for each payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subaward of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at lease one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate federal identifying number available for the Federal action identified in item 1 - (e.g., Request for Proposal (RFP) number, Invitation for Proposal (RFP) number, grant announcement number, the contract, grant, or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full name, of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the amount of box(es). Check all boxes that apply. If payment is made through in-kind contribution, specify the nature and value of the in-kind payment.

13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not an SF-LLL-A Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

ATTACHMENT K

CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS - PRIMARY COVERED TRANSACTIONS

RFP NO: 00-034

Federal Transit Administration (FTA)

The prospective Primary Participant (potential contractor for a major third-party contract), _____ _____ certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three (3) year period preceding this Proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in Paragraph 2 of this certification; and

4. Have not within a three (3) year period preceding this Proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

[If the primary participant (applicant for an FTA grant, or cooperative agreement or potential third-party contractor) is unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.]

THE PRIMARY PARTICIPANT (POTENTIAL CONTRACTOR FOR A MAJOR THIRD-PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 USC SECTIONS 3801, *ET SEQ.*, ARE APPLICABLE THERETO.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

ATTACHMENT L

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION - LOWER-TIER COVERED TRANSACTIONS

RFP NO: 00-034

The Lower-Tier Participant (potential sub-grantee or sub-recipient under a Federal Transit Administration (FTA) project, potential third-party contractor, or potential subcontractor under a major third-party contract), _____ certifies, by submission of this Proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

The Lower-Tier Participant will not knowingly enter into any lower-tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

The prospective Lower-Tier Participant agrees by submitting this proposal that it will include this requirement in all lower-tier covered transactions and in all solicitations for lower-tier covered transactions.

If the Lower-Tier Participant (potential sub-grantee or sub-recipient under an FTA project, potential third-party contractor, or potential subcontractor under a major third-party contract) is unable to certify to any of the statements in this certification, such participant shall attach an explanation to this Proposal.

THE LOWER-TIER PARTICIPANT (POTENTIAL SUB-GRANTEE OR SUB-Agreement UNDER AN FTA PROJECT, POTENTIAL THIRD-PARTY CONTRACTOR, OR POTENTIAL SUBCONTRACTOR UNDER A MAJOR THIRD-PARTY CONTRACT) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTAND THAT THE PROVISIONS OF 31 USC SECTIONS 3801, *ET SEQ.*, ARE APPLICABLE THERETO.

Name of Firm: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____

PART B: TECHNICAL SPECIFICATIONS

SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section covers the general requirements for the supply and delivery of new self-contained, package unit traction power substations, which include AC Disconnect Switch Assemblies, AC switchgear units, transformer rectifier units, DC switchgear units, negative enclosures, interconnecting buses, DC disconnect switch assemblies, and associated substation auxiliary equipment and devices including remote terminal units for SCADA. Specific requirements for each item of substation equipment are included in subsequent sections of these Specifications.

B. Abbreviations: The following abbreviations are applicable to the work of this Section:

1.	SCL	Seattle City Light
2.	DCLU	Department of Construction and Land Use, City of Seattle

1.2 APPLICABLE STANDARDS

A. Applicable Codes and Standards: Equipment shall be designed in accordance with the latest edition standards of the following agencies:

1. American National Standards Institute (ANSI).
2. City of Seattle Electrical Code Supplement
3. City of Seattle Municipal Code - Noise Control.
4. Electric Utility Service Equipment Requirements Committee (EUSERC).
5. Federal Specifications (FS).
6. Institute of Electrical and Electronics Engineers (IEEE).
7. Insulated Cable Engineers' Associations (ICEA).
8. National Electric Code (NEC).
9. National Electrical Manufacturers Association (NEMA).
10. National Electrical Safety Code (NESC).
11. National Fire Protection Association (NFPA).
12. Occupational Safety and Health Administration (OSHA).
13. Underwriters' Laboratories (UL).
14. Local Code: City of Seattle
    State of Washington.

The applicable standards of these agencies are listed individually in each specification section.

B. The Contract Documents are based on the referenced standards specifically called for herein, but the use of alternative standards of recognized national and international standards associations may be considered. King County may consider for approval alternative reference standards, which clearly pertain and are equivalent to, or require equipment of higher quality than, the specified standards. When the Contractor proposes to use an alternative reference standard, he shall identify all variations between the proposed standard and the specified standard, and submit two copies of the proposed standard with applicable Contractor's drawings or data. If the proposed standard is not written in the English language, two copies translated into English shall be attached, and if the standard is approved, this translation shall be the only valid text. If the proposed standard is not approved, the Contractor shall comply with the specified standard.

C. If the Contract Documents conflict in any way with any of the referenced standards, the Contract Documents shall take precedence. If there are conflicts between specified reference standards covering the same material or equipment, the standard, which will provide the highest quality and most suitable application, as determined by King County, shall prevail.

D. The code or standard referred to, except as modified herein shall have full force and effect as though printed in these Specifications.

E. The label of, or listing by, Underwriters' Laboratories, Inc. (UL) will be acceptable as sufficient evidence that materials and equipment subject to UL requirements do conform to the requirements of UL. A certification or published specification data statement by a manufacturer listed as member of the National Electrical Manufacturers' Association (NEMA), to the effect that materials and equipment conform to the specified NEMA standards, will be acceptable. In place of such stamps, labels, or listing, the Contractor may submit a certificate from a nationally recognized testing agency satisfactory to King County, certifying the material or equipment to have been tested according to the methods of the specified agencies, and conform to the requirements of the specified standards.

F. The codes or standards referred to, although withdrawn by the issuing agency, shall have full force and effect as though never withdrawn by the issuing agency. The last revision issued, before the code or standard was withdrawn, shall apply to the work of this Contract.

1.3 EQUIPMENT DELIVERY, PACKING, SHIPMENT AND STORAGE

The requirements of this paragraph apply to all transportation of equipment to test sites, to the installation sites or any other sites.

A. Delivery:

1. The traction substations shall be delivered to Seattle, State of Washington, in accordance with the requirements of this Specification, factory tested prior to shipment.
2. The delivery of each item of equipment shall include its transportation to the respective substation site. The site location is specified on Drawing 21-E-663 and included in Appendix A.
3. If KING COUNTY is not able to receive shipment of the traction substations within the scheduled delivery period indicated, the Contractor will be notified accordingly and shall hold such delayed unit(s) in storage at the quoted rate until specific shipping instructions are provided by King County.
4. The delivery of spare parts, maintenance equipment, and special tools shall include transportation to King County’s maintenance facilities, in the City of Seattle:

   Power Distribution Headquarters
   2255 Fourth Avenue South
   Seattle, Washington 98134-1516
   Phone: (206) 263-6580

B. Packing:

1. The equipment and appurtenances shall be packed and protected against rough handling and corrosion due to exposure to salt atmosphere or open storage. Packages shall be such that they may be safely handled with the type of equipment and hoists required for such large and heavy equipment, including forklifts and slings. The center of gravity of each package shall be plainly marked on each side.
2. The Contractor shall be solely responsible for the adequacy of the packaging of equipment and for the furnishing and delivering of undamaged equipment to the site.
3. Packages shall have international markings indicating "This Side Up," "Fragile," "Use No Hooks," etc., as required.
4. Packaging shall be such as to permit as much inspection as practicable at the point of delivery.

5. Any unpacking and repacking necessary to comply with U.S. Custom's regulations shall be the responsibility of the Contractor, at no additional cost to King County.

C. Shipment and Storage:

1. The Contractor shall arrange and be responsible for shipment of all equipment and appurtenances for delivery to Seattle, Washington.
2. The equipment shall be shipped in fully assembled packaged units. When loaded on vessels, no on-deck shipment shall be permitted. Each shipping container shall be provided with a continuous recording impactograph mounted on the interior of the container. The impactograph shall be set to record impacts in the 2 to 5 g range.
3. No shipment is completed until King County has received the Bill of Lading or Express Receipt.
4. The Contractor agrees to assume all risk of loss or damage in transit. It is intended that the Contractor shall repair or replace any lost or damaged shipment as soon as possible. The Contractor shall process all claims in connection with any such loss or damage, and receive all payments paid by the Carrier as a result of such loss or damage claims.
5. Shipments shall be scheduled to arrive at the site for unloading during normal working hours, and any demurrage or overtime charges incurred as a result of unscheduled arrivals or arrivals requiring work at other than normal working hours shall be at the Contractor's expense. The Contractor shall provide a forty eight-hour notice prior to the arrival of the shipment to Seattle to King County's Corey Traylor at (206) 689-4608.

l.4 INSTALLATION SUPERVISOR

A. The Contractor shall provide an Installation Supervisor to provide installation supervision services to King County and King County's substation site contractor. These services are required to ensure that the substation furnished under this Contract is properly installed, connected, tested and commissioned for service.

B. The Contractor's Installation Supervisor shall supervise the complete installation, field-testing and commissioning of the equipment furnished under this Contract.

C. King County will coordinate the scheduling of the Installation Supervisor's services and will give the Contractor at least 30 days advance notice of the need for such service. The Contractor shall cooperate with King County's Project Representative in order to best conform to the installation and testing schedules and to provide the Installation Supervisor at the site when needed.

D. The Contractor's representatives, including the Contractor's Installation Supervisor, shall speak and write English fluently.

E. Measurement for payment for the services of an installation supervisor will be the number of 8-hour days as directed by King County. Measurement for payment for overtime services of an installation supervisor will be the number of hours of overtime services in excess of 8 hours in a work day and the number of hours on Saturday, Sunday and legal holidays subject to prior authorization of King County, in writing.

1.5 TRAINING

A. The Contractor shall conduct a training course at a time to be scheduled by King County, but to be completed no later than one month after final acceptance of the last items of equipment furnished under this Contract, in facilities provided by King County in the city of Seattle. Two electrical system operators will attend two workdays of training at a time. A total of six consecutive working days training are required for six operators.

B. The subject matter covered in the training course shall include the operation and maintenance of every item of equipment supplied by the Contractor.

C. The text for the training program shall be the Operation and Maintenance Manual prepared by the Contractor and described in Paragraph 1.10.F below.

D. The training program shall utilize formal and informal instruction, with extensive use of slides, models, mock-ups, diagrams and other training aids.

E. King County trainees will have basic mechanical and electrical maintenance skills, and knowledge of the technical features of the existing traction power and electrification system.

F. The Contractor's recommendations for the frequency of testing, testing methods and required instrumentation shall be covered where applicable. Access, removal and disassembly of equipment, where not self-evident, shall be covered. Overhaul procedures, where covered in detail in the Operation and Maintenance Manual, need not be covered.

G. After completion of the training sessions, the Contractor shall furnish to King County one complete set of the instruction materials used, including lesson plans, notes, film, slides and audiotapes.

l.6 DESIGN CONFERENCE

At the start of the project, the Contractor shall attend a conference at the offices of King County, or at the Contractor’s facility, at the discretion of King County, for the purpose of clarifying design details.

1.7 FACTORY INSPECTION

The Contractor shall provide, without charge, all reasonable factory entry and facilities to satisfy King County or its agents that the material and equipment being furnished is in accordance with the applicable standards and contract documents.

1.8 SAFETY DESIGN

A. Equipment design and operational procedures shall include, but not be limited to, the following safety requirements:

1. Avoiding or eliminating hazards by design selection, material selection, or substitution.
2. Controlling and minimizing hazards which cannot be avoided or eliminated.
3. Incorporating fail-safe principles where failures would otherwise disable the system or cause human injury, damage to equipment, or inadvertent operation of critical equipment.
4. Locating equipment components so that access to them by authorized personnel during operation, maintenance, repair, or adjustment shall not require exposure to hazards such as entrapment, chemical burns, electrical shock, cutting edges, sharp points, toxic atmospheres, or like hazards.
5. Providing suitable warning and caution notes in operation, assembly, maintenance, and repair instructions; and distinctive markings on hazardous components, equipment, or facilities for personnel protection. King County will provide all exterior warning signs, which will be attached to the substation enclosures or fence by the Installation Contractor.

1.9 SAFETY GROUNDING

A. The contractor shall include provisions for the use of grounding buggies in the AC and DC switchgear lineups. The intent of the grounding buggies is to provide physical grounding of all equipment and enclosures subject to voltages over 600V AC/DC. This includes but is not limited to the 26kV switchgear, the transformer rectifier unit and the 700VDC switchgear. Equipment and enclosures exposed to 600V AC/DC or higher but not grounded via the ground buggies shall be identified and provided with separate readily accessible ground pads.

1.10 MONTHLY PROGRESS REPORTS/UPDATES

A. Progress reports shall be submitted on a monthly basis by the fifth (5th) day of each month. The report shall include the following information for the reporting period:
   1. Narrative summary of progress made to each item of work covered, including a description of the current or anticipated problems and corrective actions to be taken;
   2. Actual start dates, percent completed and finish dates for activities currently scheduled;
   3. Revisions, if any, to the Contract Schedule specified in Paragraph 1.10.G;
   4. Cause of delay, if any, of critical work activities; and
   5. Anticipated activities for the next month.

1.11 SUBMITTALS

A. General:
   1. The Contractor shall submit drawings, technical data, catalog cuts, calculations, test documents, monthly progress reports/updates and Operations and Maintenance manuals, in English, to King County for approval. The submittals shall provide evidence that the Contractor has complied with the Contract Documents and shall include a master schedule that provides for the control of all submittals with appropriate entries. All submittals shall be accompanied by King County's Form #1300-A, Submittal Transmittal Form. A copy of this form is included in Appendix B of these Specifications.
   2. A registered Professional Engineer shall sign submittals, including drawings, technical data, calculations and test documents.
   3. Each submittal shall indicate the corresponding Article or Section number of the Contract Document under which it is required. Each drawing prepared specifically for this contract by the Contractor shall be D-size (22 inches by 34 inches), and shall have its own drawing number and title clearly identified in the title block. Standard IEEE device symbols and nomenclature shall be used unless otherwise approved by King County. Part numbers and names shall be used to identify components. All submittals shall have a revision number and date.
   4. King County intends to review and approve submittals for design and compliance with the contract within 30 calendar days of receipt of submittals. In the event the submittals require changes or further explanation, one marked print of each submittal will be returned to the Contractor for corrections and shall be resubmitted. Delays due to resubmittal of disapproved submittals shall be the full responsibility of the Contractor and will not provide a basis for an extension of time.

B. Submittals:
   1. Within 30 calendar days after Award of Contract, the Contractor shall submit the following for approval:
      a. Single-line diagram
      b. Plans, elevations and cross-sections showing layouts, physical dimensions, accessibility for maintenance, and internal construction of each item of substation equipment.
      c. Prefabricated building design drawing for the substation, containing information required by DCLU's Information Bulletin No. 304 Building Permit Requirements for Prefabricated Steel Buildings.
      d. Contract Schedule as specified in Paragraph 1.10.G.
   2. Within 60 calendar days after Award of Contract, the Contractor shall submit the following for approval:
      a. Schematic diagrams of the substation equipment, including functional descriptions of the control circuits.
      b. Technical data catalog cuts of each item of substation equipment, and all protective relays, meters, auxiliary relays and devices, and any other major units or subsystem.
      c. Instrument transformer ratio, phase angle and excitation characteristic curves.
      d. Mounting details for each substation equipment.

e. Panel layout, showing locations of all control and protective devices and meters.

f. Wiring diagrams of all equipment, showing internal wiring with point-to-point connections, terminal block arrangement and identification of each outgoing power and control terminal. All devices shall be shown in their respective physical locations.

g. Interconnection diagrams of the equipment in the traction substation, showing terminal blocks of individual units, and interconnections between units. All devices shall be shown in their respective physical locations.

h. Protective device range and setting calculations showing basis on which each relay is set. Protective device coordination curves shall be submitted showing coordination of all equipment. Plots of rectifier design capability shall be included with actual margin of coordination (from breaker trip to design capability) clearly indicated at each of 150, and 200 percent full-load current and short-circuit current.

i. Equipment nameplate data.

j. Test plans, as described in Paragraph 1.10.E.1.

k. Engineering calculations including battery and battery charger sizing, cable sizing, heat loss and vent fan sizing, seismic, and other equipment sizing.

3. Three sets of preliminary Operations and Maintenance Manuals (see Paragraph 1.10.F) shall be submitted for review 30 calendar days prior to the shipment of the first traction substation. Six sets shall be submitted in their final form, reflecting as-built conditions within 30 days after final acceptance of the last items of equipment furnished under this Contract.

4. A complete training program agenda (see Paragraph 1.5) shall be submitted for review 30 calendar days prior to the shipment of the first traction substation. The agenda shall include the subject to be covered, the scope of the coverage and the time allotted to each subject. Six copies of the approved training program agenda shall be submitted with the final submittal of the Operation and Maintenance Manuals.

5. Within 30 calendar days after completion of each test, the Contractor shall submit test reports to King County for approval. Equipment shall not be shipped until after all factory-tests reports documenting tests on the respective equipment have been approved by King County.

C. Drawings, Technical Data, and Catalog Cuts: Drawings, technical data, and catalog cuts shall be submitted as follows:

1. For Review and Manufacture: one good quality reproducible drawing and two copies of all drawings referred to in Paragraphs 1.10.B.1 and 1.10.B.2. Three copies of all Contractor standard drawings, catalog cuts, instruction books, tabulations, and the like, which are not adaptable for the furnishing of reproducible. Typical drawings for each equipment type are acceptable for review and manufacture.

2. For Permanent Record: One copy of all Contractors' drawings, on translucent vellum (20lb. min), which represent the as-built condition of the substations and the final electronic files as specified on the section below. Two copies of all Contractor standard drawings, catalog cuts, instruction books, tabulations and the like, not adaptable for the furnishing of reproducibles. Design or manufacturing changes occurring after submittal shall be immediately reflected on the drawings and a new submittal of these drawings shall be made. One complete set of drawings shall be required for the substation for King County's permanent record. Each drawing set shall include a drawing for each transformer rectifier unit, circuit breaker, disconnect switch, and other substation equipment. Typical drawings showing similar equipment in another substation are not acceptable.

3. CAD requirements: All electronic drawings shall be Autocad release 14 or later. The final electronic files shall be submitted on one of the following media types: 3-1/2" HD 1.44MB Floppy Disk (DOS Format), or 3-1/2" LS-120 120MB Super Disk (DOS Format), or Iomega 100MB Zip Disk, or Compact Disk (CD). All data submitted electronically shall include a detailed label on each media as well as a detailed index list save in ASCII text format on the first media in the set. For more information about electronic document requirements and or drafting standards contact King County's Jeff Suter at (206) 684-1302.

D. Calculations: Six copies of all calculations referred to in subparagraphs 1.10.B.2.h and 1.10.B.2.k shall

be submitted and shall include the following:

1. Title of calculation
2. Statement of problem
3. Source of design criteria
4. Source of relevant equations and references
5. Computations
6. Conclusions or findings

E. Test Documents test plan, procedures, and reports for tests specified in Section 16950 shall conform to the requirements herein. Six copies of each test document shall be submitted.

1. Test Plan: The test plan shall be used as a controlling document for all tests, and shall include the following information:
   a. Title of each test with reference to the respective Article or Paragraph number in the technical specifications.
   b. Organization performing each test.
   c. Test location.
   d. Submittal date of each test procedure, test report, and certified test document.
   e. Starting date of each test.
   f. Completion date of each test.
2. Test Procedures: The Contractor shall develop detailed test procedures for each test. Test procedures shall be submitted to King County for review and comment 30 calendar days prior to performing each test. Test procedures shall be stapled or bound in volumes. Each procedure shall be individually numbered in a logical sequence with all pages numbered. The first sheet of the procedure shall contain the title, date, and name of individuals who prepared and approved the procedure. Test procedures will not be required if such procedures are described in ANSI, IEEE, or NEMA standards, or standards approved by King County and two copies of the standard are submitted with the related test. Each set of procedures shall include the following information:
   a. Title of test.
   b. Test objectives.
   c. Test location and date of test.
   d. Equipment and instrumentation with the accuracies and calibration data.
   e. Test criteria including test setup with circuit diagrams and test sequence.
   f. Step-by-step procedure for performing the test.
   g. Test criteria including data evaluation procedures.
   h. Test data requirements including forms and format for recording data.
   i. Primary and supporting test agency.
3. Test Reports: The Contractor shall prepare test reports for each test to document test results. Each test report shall be stapled or bound in volumes, with pages individually numbered in a logical sequence with all pages numbered. The first sheet of the report shall contain the title, date, and name of individuals who prepared and approved the test report. Each test report shall include the following information.
   a. Title of test.
   b. Test objectives.
   c. Summary and conclusions.
   d. Location and date of test.
   e. Results including tables, curves, photographs, and any additional test data required to support the test results.
   f. Descriptions of all failures and modifications, including reasons for such failures, and modifications and names of individuals approving such modifications.
   g. Abbreviations and references.
   h. Names, titles and signatures of test participants and witnesses.

F. Operation and Maintenance Manuals: The Contractor shall provide Operation and Maintenance (O&M) Manuals for the traction substation as follows:

1. Instruction Manual: The manual shall be written in English and illustrated in detail to the

component level, including assemblies, subassemblies and components. It shall contain a detailed analysis of each component so that maintenance personnel can effectively service, inspect, maintain, adjust, troubleshoot, and repair the equipment. Each manual shall be divided into the following sections:

a. Introduction: The purpose of the manual, special tools and equipment, and safety precautions.

b. General Information and Specifications: A general description of the substation and specifications of major components in the substation.

c. Theory of operations: The relationship of assemblies, subassemblies, components and interchangeability of components, and explanation and analysis of their functions to the smallest replaceable components.

d. Operating Procedures: The locations and functional descriptions of all controls and indicators.

e. Troubleshooting: A list, in tabular format, of all symptoms, probable causes of malfunction or improper operation, and appropriate remedies including the smallest replaceable components.

f. Corrective Maintenance: Step-by-step removal, replacement, and adjustment procedures to the smallest replaceable components. Step-by-step detailed test procedures shall be provided to test all components that have been reassembled or adjusted.

g. Preventive Maintenance: A list, in tabular format, of all lubrication requirements, types of lubricants, and frequency of application; inspection requirements and limits; component replacement and repair schedule; required adjustment, limits and tolerances; optimum test point readings; calibration charts; and procedures in performing preventive maintenance.

h. Appendix: A list of all abbreviations and circuit symbols used. All factory test procedures shall be provided. A parts catalog and additional data shall be included here.

2. Parts Catalog: Each O&M manual shall include a parts catalog. The parts catalog shall enumerate and describe every part to the lowest level of replaceable components. The description shall include component symbol, description, rating, accuracy, manufacturer's name and address, manufacturer's part number, commercial equivalents, and quantity per assembly or subassembly. The description of each component shall be complete to the extent that the material composition of each component is given. The parts catalog shall identify the appropriate locations of the parts and shall group each component by assemblies or subassemblies within each subsystem so that each component can be identified as being part of the next larger assembly.

3. Drawings and Illustrations: Each O&M manual shall be supported by, and shall refer to, illustrations, drawings, or photographs to the extent necessary to assure comprehension. The parts catalog shall include parts identification drawings in isometric views or photographs of actual equipment identifying symbols used on the parts list, identification labels on equipment, and schematics. The drawings shall have dimensions of all assemblies, subassemblies and components and shall include the following:

   a. Functional block diagrams
   b. Control schematic diagrams
   c. Simplified circuit diagrams
   d. Wiring diagrams including wire color-coding, wire size, rating and terminal numbers.

4. Format: All O&M manuals shall be in 3-ring binders, printed on good quality bond paper (20 pound minimum), with reinforced, punched holes. The binders shall be resistant to oil, moisture, and wear, commensurate with their intended daily use. All text and illustrations used in these manuals shall be properly produced to assure legibility of lettering, symbols, lines, and other details.

5. Manual Size: The manual shall be nominally 8.5 inches by 11 inches. Illustrations and drawings shall be 8.5 inches by 11 inches or 17 inches by 11 inches folded and bound to conform to the 8.5-inch format. Folded sheets shall display identification on the last fold, legible without unfolding.

6. Revisions: The Contractor shall provide revised pages covering all changes, whether required by

change of design or procedures or due to error. Revisions shall be kept current during the warranty period.

G. Contract Schedule: The Contractor shall submit a time scaled bar chart schedule covering the complete procurement process to King County for approval.

1. The schedule shall represent a practical plan to complete the work within the Contract Time, and shall convey the Contractor's intent in the manner of prosecution and progress of the work. The schedule shall provide key dates of significant events in sufficient detail and clarity of form so that the work can be monitored at any time by King County. Included in the schedule shall be dates relating to submittals and approvals, design, procurement, assembly, testing, delivery and inspection. Work that is performed by subcontract shall be clearly defined.
2. The submittal of schedules shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract and that the work will be executed in the sequence indicated in the schedule. The schedule shall be submitted in a medium no larger that 11 inches by 17 inches nor smaller than 8-1/2 inches by 11 inches. The Contractor shall make all corrections to the schedule requested by King County and resubmit the schedule for approval.
3. Any changes to the planned sequence, activity durations, interdependency of activities and any other change to the schedule shall be submitted separately for review and approval. Written notification and explanation for the proposed changes and separately revised schedule shall accompany the submittal. Changes shall not be incorporated into the current schedule until King County has approved the submittal.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16150

EQUIPMENT MANUFACTURING REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

This Specification Section covers the manufacturing requirements for the substation equipment being furnished under this Contract, in addition to the specific requirements of other sections.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - Z55.1 Gray Finishes for Industrial Apparatus and Equipment
2. National Electrical Manufactures' Association (NEMA):
   - PR4 Plugs, Receptacles, and Cables Connectors of the Pin and Sleeve Type for Industrial Use
   - SG5 Power Switchgear Assemblies
   - WC3 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
3. Federal Specifications (FS):
   - QQ-B-825a Bus Bar; Copper, Aluminum, or Aluminum Alloy

PART 2 - PRODUCTS

2.1 EQUIPMENT REQUIREMENTS

The manufacture of the traction substations shall be based on the general requirements specified herein.

A. Environment: All substation equipment shall be suitable for operation at their standard ratings under the specified conditions, and shall operate without impairment throughout the range of worst values listed below.

1. Temperature: Maximum ambient outdoor temperature will be 40 degrees C. Twenty-four hour average will be 30 degrees C.
2. Humidity: Relative humidity will range from 28 to 100 percent, non-condensating.
3. Wind: Design wind velocity will be 80 mph.
4. Seismic: Zone Three, as defined in the Uniform Building Code. Electrical equipment seismic classification shall conform to the requirements of category II: i.e., integrity of equipment and function.
5. Lightning: Thunderstorm phenomenon frequency will be five days per year.
6. Altitude: Less than 500 feet above sea level.
7. Design Live Load for Snow: 25-lbs./sq. ft.

B. UTILITY DATA

1. Power to the traction power substations will be supplied from Seattle City Light's (SCL's) 26.4 kV, three-phase, four-wire, 60-Hz, effectively grounded neutral system.
2. The utility metering point will be on the 26.4 kV side, as shown on the Drawings. The utility will furnish and install a metering cubicle, complete with instrument transformers and revenue meters, external to the substation enclosure.
3. At the utility supply point, SCL will provide the service entrance cables, stress cones and

terminating kits, and will make the connection at the interface point. The Contractor shall provide NEMA drilled two-hole terminal pads for the utility service entrance cables.

4. In the substation the service entrance cables will be terminated in the AC Switchgear, in the same enclosure housing the station service transformer. The cable size will be 3 single No. 1 AWG, stranded, 28 kV insulation. with concentric neutral, aluminum cable per phase.
5. The substation shall be designed to operate under the following conditions set by SCL:
   a. Nominal system voltage: 26.4 kV.
   b. Rated Maximum voltage: 27.3 kV.
   c. Rated minimum voltage: 25.55 kV.
   d. Available Fault Current:
      3-phase line to ground: 35,000 amperes
      Single line to ground: 20,000 amperes
   e. Rated impulse-withstand voltage: 125 kV BIL.

C. DC System Data: All equipment shall be designed in accordance with the following characteristics of the DC traction power system:
1. Maximum no-load voltage: 700 V DC.
2. Maximum voltage with regeneration: 750 V DC.
3. DC withstand voltage: 5.2 kV.

D. Materials and Equipment:
1. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such materials and equipment and shall be the manufacturer's latest design.
2. Equipment of the same type and rating shall be identical and interchangeable, of the same physical and electrical design and manufacture in every respect, including equipment internal wiring and auxiliary device locations.

E. Auxiliary Power Supply:
1. The substation equipment shall be designed for operation with the following auxiliary power supply:
   a. Control circuits: 125 V DC
   b. AC Auxiliary Power: 120V AC, single phase
2. One (1) isolating transformer shall be provided to furnish each DC equipment enclosure with 120 V AC auxiliary power lighting circuits isolated from the 700 V DC circuits and ground. All 120 V AC circuit wiring in DC equipment enclosures shall have 1,000-volt insulation with a DC withstand voltage of 5.2 kV.

F. Equipment Requirements:
1. Equipment Arrangement: Suggested equipment arrangement, locations, and maximum dimensions for the substation are shown in the Drawings. The arrangement used shall result in minimum space requirements, considering personnel safety, and accessibility for maintenance. The Contractor may modify the equipment layout shown on the Drawings, and obtain approval of King County prior to fabrication.
2. Equipment Integrity: Equipment as assembled for operation shall have no openings, which would allow the accidental entry of hand tools or similar objects. Products of circuit breaker arcing in normal and fault-clearing operations shall be controlled so as not to jeopardize the substation structure or finish, and not to compromise the safety of operating personnel.
3. Repairability: Equipment furnished under this contract shall be field repairable to the maximum extent possible, in order to facilitate on-site maintenance and repair by King County, using its own facilities and personnel. Return of equipment to the manufacturer's facilities, for repair or replacement, shall be required only where necessary to comply with Warranty provisions.

G. Nameplates:
1. Each switchgear assembly, transformer, rectifier unit, circuit breaker unit, auxiliary unit, control panel, panel-mounted and auxiliary device shall be provided with a nameplate for proper

identification. Similarly, nameplates shall be provided for all internally mounted devices and fuses. The legends of all nameplates shall be submitted to King County for approval.

2. Nameplates identifying major equipment shall have lettering one inch high (minimum). Where rear access is provided two nameplates shall be furnished, one on the front and one on the rear of the equipment.
3. Nameplates identifying AC circuit breaker and DC circuit breakers shall have lettering one inch high (minimum). The inscription shall include circuit breaker or disconnect switch number and service. One nameplate shall be provided on the front, one on the rear of each unit.
4. Nameplates for relays, meters, control and instrument switches, fuses and auxiliary devices shall have 0.125-inch (minimum) lettering. For protective and auxiliary relays, the name plate inscription shall include the device number and function. Nameplates for fuses shall indicate fuse rating, polarity, and circuit identification.
5. All nameplates shall be laminated, three-ply phenolic plastic with a black surface and white core. All exposed edges shall be beveled (relieved). Nameplates shall be fastened with stainless steel screws. The use of adhesives will not be permitted.

H. Mimic Bus: A mimic bus shall be provided on the front of all transformer and rectifier enclosures and AC and DC switchgear and disconnect switch assemblies, with symbols of all components using materials and methods similar to that described above for nameplates. A mimic bus for the DC disconnect switch assembly shall also be provided on the front of the DC switchgear.

I. Equipment Wiring:

1. Secondary and control wiring (low voltage) shall be minimum No. 14 AWG, stranded copper conductors, Type SIS insulation. All wiring subjected to 700 V DC potential shall be No. 12 AWG or larger with 1,000 V insulation. Wiring shall be neatly laced and properly supported. There shall be no splices in the switchgear wiring. Control and instrument (low voltage) wiring shall be isolated from high-voltage compartments and shall be readily accessible. Wiring shall be protected as required from mechanical injury. All wiring, including wiring within an equipment item, within a cubicle or between cubicles and enclosures, shall be installed, connected and tested prior to shipment. Adhesive mounted wire mounts will not be allowed.
2. Control wiring shall be protected by a suitable raceway such as hinged cover plastic gutter or channel, designed for this purpose and approved by King County.
3. Connections shall be made only at terminals on the devices, on terminal blocks, or the ground bus. No splices or taps shall be made between these terminal points. Connections for wiring shall be made using ring-type compression connectors with insulated compression sleeves using only manufacturer recommended tools. The insulated sleeve shall firmly grip the wire insulation and the metallic portion shall firmly grip the strands of the conductors. All control, metering, and relaying circuits requiring external connections and all unused terminals on auxiliary contacts, devices, relays, instrument transformers, and control switches shall be wired to conveniently located terminal blocks having washer head screw-type terminals, circuit-marking strips, and phenolic-laminated dust covers. Shorting-type terminal blocks shall be provided for current-transformer connections. All 700 V DC circuits shall be brought out to separate terminal blocks mounted on at least two separate stand off insulators with a special cover, opposite polarity shall be separated and specially guarded. There shall be separate terminal blocks for low voltage AC, and 700 V DC circuits. A minimum of ten- percent spare terminals, but no less than four terminals, shall be provided on each terminal block. FAST (Fast Accessible Safe Termination) installation system is not acceptable.
4. Terminal blocks for 700 V DC circuits shall be rated for 1,000 V and shall have marking strips for wire identification. Terminal blocks rated for 1,000 V DC shall be Marathon type 1600 or approved equal. All internal wiring shall be identified at each termination by means of a suitable dark black, plastic marking on a matte surface, the print shall be laser printer quality. Tags relying upon adhesive or taped on markers will not be acceptable. Each terminal block and device shall have its own unique numbers and or letters for identification. Each terminal block and device designation shall be used only once in the (2) two substations. Wires connected to

terminal blocks and devices shall have wire numbers and or letters indicating the terminal block or device the wire is coming from. Type of marking strips and print quality shall be submitted to King County for approval.

5. All control and instrument wiring within high-voltage and 700 V DC compartments shall have a protective covering. The interconnecting wires and cables between cubicles, including the common potential and control buses, shall be continuous and shall terminate at terminal blocks.
6. All secondary leads of each current transformer and each potential transformer shall be brought out to individual terminal blocks in the terminal compartment.
7. Test Points: Test points shall be provided for all meters, relays, transducers and other devices. Test points shall be test switches or terminal blocks, and shall be separated from live buses and conveniently located. Test blocks shall be provided for CT and PT circuits. The use of terminal blocks between devices shall be maximized.
8. All wiring and cables that pass through cubicles or work area shall be installed in suitable raceways. Wires connecting identical function devices shall have identically colored wires. NEMA Standard WC 3 shall be followed.
9. Low voltage wire and cable shall be UL listed for the intended purpose.
10. All wire and cable shall be 98 percent-conductivity copper. Class B stranded, soft drawn, unless otherwise shown.
11. Control cable shall be multiconductor with ethylene-propylene insulated individual wires, polyester supported overall aluminum foil shield and PVC jacket. The temperature rating shall be 90 degrees C continuous.
12. Panel wiring shall be NEC Type SIS or TBC complying with UL 83 flame retardant properties test.
13. Color code of multiple conductor control cables shall conform to NEMA WC 5, method 1, using colors in accordance with Table I-2.
14. Layout and location of devices and wiring of like units shall be identical.
15. Devices requiring regular calibration, resetting or operation shall be conveniently located within easy reach of personnel.
16. All control circuits and wiring requiring position indications of circuit breakers or disconnect switches shall be wired from auxiliary contacts operated by the circuit breaker or disconnect switch mechanism. Auxiliary relays to monitor position indication of circuit breakers or disconnect switches shall not be acceptable.

J. Radio Frequency Interference: All substation equipment, protective relays meters, instruments and devices shall be designed to minimize the radio frequency generated and shall be immune from inadvertent operation by ambient radio frequency signals.

K. Indicator Lamps: All indicating lamps shall be light emitting diodes (LED's), Viewable in direct sunlight, 130V Bi-polar (BP) AC/DC.

L. Fuses: Removable fuses with insulated fuse holders and insulated fuse blocks shall be provided for all protective relays, instruments and transducers as shown on the Drawings. The fuse blocks and fuse holders for 700 V DC circuits shall be mounted on glastic or equal insulation boards. The screws for fixing fuse blocks shall be threaded type and shall not protrude behind the insulation boards. The fuses shall be Bussman FBP or approved equal, suitable for 700 V DC. Control circuits other than 700 V DC circuits shall use replaceable fuses.

M. Buses shall be high conductivity copper, conforming to FS QQ-B-825a, of sufficient size to carry the specified currents without exceeding the allowable temperature rise specified in the applicable standards. The buses shall withstand the mechanical and thermal stresses caused by the specified maximum short circuit currents. Bus connections shall be welded or bolted. Where bolted bus connections or taps are used. The mating surfaces shall be silver plated. Bolts for bolted connections shall be furnished and shall be silicon bronze or suitably plated high strength steel, with flat washers. Flange connections and buses shall be coordinated to mate properly with adjacent equipment terminals and enclosures.

N. 5-KV DC POWER CABLES

1. General: The 5 KV DC power cable shall be single conductor, stranded, non-shielded, uncoated-copper conductors, for installation in metal wireways, cable trays, conduits, underground ductbanks, in wet or dry locations, at a maximum conductor temperature of 90 degrees C.
2. Insulation
   A. Power Cables shall be insulated with properly vulcanized, heat and moisture-resistant, low-halogen, low smoke, ethylene-propylene insulation compound, in accordance with ICEA S-68-516 and as specified herein.
   B. The electrical and physical characteristics of the insulation shall meet the Type I requirements as specified in ICEA S-68-516.
   C. The minimum average thickness of the insulation shall be in accordance with ICEA S-68-516, Table 3-1.
   D. The insulation shall be circular in cross-section, and so centered that the minimum wall thickness shall be not less than 90 percent of the average thickness specified.
   E. A suitable opaque barrier tape shall be applied next to the conductor where needed to provide free stripping.
   F. The insulation, when tested at the average thickness specified for smoke generation in accordance with the test method specified in ASTM E662.

3. Jacket
   A. A low smoke, low-halogen, flame-resistant, chlorosulfonated polyethylene jacket shall be applied tightly over the conductor insulation. The jacket compound shall meet the requirements for heavy-duty chlorosulfonated polyethylene in accordance with ICEA S-68-516.
   B. The minimum thickness shall be not less than 65 mils.
   C. The clorosulfonated polyethylene jacket, when tested at the average thickness specified for smoke generation in accordance with ASTM E662.
   D. Cable Identification: The following information shall be printed on the cable jacket, in contrasting color, at approximately 3-foot intervals:
      a. Manufacturer's name
      b. Year of manufacture
      c. Conductor size
      d. Voltage rating
      e. Insulation type and thickness (mils)
      f. Jacket type and thickness (mils)
      g. Other appropriate data, if any

4. Conductors
   A. Conductors shall be stranded annealed-uncoated copper in accordance with ASTM B3.
   B. Feeder cables shall be 500 kCMIL as shown, Class B stranding in accordance with ASTM B8.
   C. The conductor resistance shall be in accordance with ICEA S-68-516, Section 2.5.2.

2.2 EQUIPMENT ENCLOSURES

A. General: The following paragraphs cover the general requirements for the manufacture of the enclosures for the indoor substation equipment. The requirements for the exterior enclosure of the substation is specified in Section 16385.

B. Construction: Equipment enclosures shall be indoor type, rigid, self-supporting and self-contained, electrically welded steel or bolted construction with proper bonding to ensure electrical continuity. Steel sheet shall be special panel grade, 11 gauge. Doors shall also be 11 gauge, reinforced by suitable flanges, channels or other stiffening members to prevent distortion. Hinges shall be heavy duty, stainless steel,

with stainless steel hinge pins. All doors and panels shall be removable. All doors shall be securely fastened in the closed position with at least three metal latches, easily opened without tools. Doors shall have a handle, and stops and latches to hold them securely in the open position. All doors shall have provisions for padlocking. An inspection window, gasket mounted, shall be provided on all doors providing access to switches, instruments, transformer taps and indicators where visual inspection is necessary or desirable. Each bay, or compartment thereof, containing high-voltage components, shall be provided with a protective screen door(s), bolted closed, to guard against inadvertent entry when the enclosure door is open. Doors or hinged bolted panels providing access to other high-voltage components shall be provided with flush-mounted key operated snap locks.

C. Ventilation: Louvers shall be provided at the top and bottom of doors on bays containing heat-generating equipment.

D. Space Heaters: Thermostatically controlled strip type space heaters shall be provided in each individual equipment enclosure to prevent condensation. The heaters shall be provided with suitable rigid metal guard and located such as to prevent damage to adjacent equipment. The heaters shall be rated for 240 V AC but operated at 120 V AC.

E. Lighting: The interior of equipment enclosures, where necessary or desirable, shall be lighted with incandescent, 120 V AC lamps, locally switched.

F. Indoor Enclosure (Cabinet) Finish: All surfaces of indoor enclosures shall be given a phosphatizing bath. An iron-oxide zinc chromate anti-corrosion primer shall be applied to all surfaces including those structural parts that may become inaccessible. The finish coat shall be a high-bake semi-gloss alkyd melamine enamel. After baking, the complete finish shall be maintained at an average thickness of 2 mils. The finish shall be off white, No. 70, ANSI Standard Z55.1. The inside of enclosures, if made of galvanized steel, need not be painted.

2.3 SPECIAL TOOLS AND TEMPLATES

The Contractor shall furnish two set of all special tools, such as special relay tools, required for the operation and maintenance of all equipment furnished under this Contract. Two sets of special gauges and templates necessary for field erection shall be provided. Two sets of necessary equipment for safe withdrawal and movement of the circuit breakers shall be provided.

2.4 SPARE PARTS

A. Spare parts, which are recommended by the Contractor, in addition to the spare parts specified, shall be provided at the option of King County, at the separate prices quoted therefor in the Bid. Quantities shall be as recommended for five years of normal operation. Prices shall be firm for the life of the Contract. The unit prices quoted for the Contractor recommended spare parts shall not be part of the Contract price.

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16325

TRANSFORMER RECTIFIER

PART 1 - GENERAL

1.1 SCOPE

This Specification Section covers the furnishing of transformer rectifier units.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of those Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - C34.2 Practices and Requirements for Semiconductor Power Rectifiers
   - C57.12.01 General Requirements for Dry-Type Distribution and Power Transformer
   - C57.12.91 Test Code for Dry-Type Distribution and Power Transformers
2. Electronic Industries Association (EIA):
   - RS-282 Recommended Standards for Silicon Rectifier Diodes and Stacks
3. National Electrical Manufacturer's Association (NEMA):
   - RI-9 Silicon Rectifier Units for Transportation Power Supplies
   - SG 5 Power Switchgear Assemblies
   - TR-1 Transformers, Regulators and Reactors

PART 2 - PRODUCTS

2.1 GENERAL

A. Each transformer rectifier unit shall consist of a separate rectifier transformer and rectifier, as shown on the Drawings. The units shall be complete with auxiliaries; controls; wireways; interconnecting AC and DC buses; enclosures; and all necessary hardware, wiring and devices. The units shall be complete, with all equipment, from the high voltage side of the transformer to the DC bus connections to the DC switchgear and negative enclosure. Except as otherwise specified, the transformer rectifier shall conform to ANSI C34.2, C57.12.01, and C57.12.91, and NEMA RI 9, SG 5, and TR 1.

B. Application: The transformer rectifier units shall convert 26.4 kV, 60 Hz, effectively grounded, 3 phase, 3 conductor primary power to 672 volts DC at 100 percent of full load. The transformer rectifier units shall receive AC power from the 27 kV AC metal clad switchgear. The DC output of the rectifier units shall feed the metal enclosed DC switchgear, which controls and protects the power supply to the trolley overhead contact wires.

C. Ratings: The transformer rectifier units shall be rated 1500 kilowatts, as shown on the Drawings, measured at 672V DC at the output terminals. The transformer rectifiers shall be 12 phase, double-way, in accordance with ANSI C34.2, Circuit No. 31. Other technical characteristics shall be:

1. Loading Condition: The transformer rectifier units shall be designed to meet the duty cycle specified in NEMA RI-9 for medium traction power service, defined as follows: The transformer rectifier units shall be capable of operating continuously at 100 percent of rated load amperes until constant temperatures have been reached by all parts of the transformer rectifier units. After constant full load temperatures are reached, the transformer rectifier units shall be capable of operating at 150 percent of rated load amperes for 2 hours or at 300 percent of rated load amperes for 1 minute. At any time that the full load rated temperatures are not exceeded (at the

start of an overload), the transformer rectifier units shall be capable of operating at the specified overload ratings.

2. Efficiency: The overall efficiency of each transformer rectifier assembly shall be greater than 98 percent at its continuous rating.
3. Power Factor: The displacement power factor of each transformer rectifier assembly shall be 0.95 or greater from 25 percent to full load at rated AC voltage.
4. Regulation: The voltage on the DC bus shall be within the following limits with the nominal AC voltage maintained at the transformer primary and the transformer set at the rated voltage tap:

Output DC Voltage (Volts)

Output Current	Maximum	Nominal	Minimum
No load	700		
100% full load	675	672	669
150% full load	662	658	654
300% full load	624	616	608

5. Low Load Resisters (LLR): The no-load voltage shall be limited to the value specified. A bleeder resistance load shall be provided, if required, to prevent excessive voltage rise at no-load.

D. Transients: Protection shall be provided against transient surge voltages on both the AC and the DC side of the rectifier. If fuses are used in suppression networks, they shall be monitored by visual indicators and equipped with devices capable of monitoring by remote annunciator.

E. Short Circuit Ratings:
1. Transformer: Transformer shall be designed to withstand a full short circuit with shorted low-voltage terminals, and rated voltage on the high-voltage terminals, in accordance with ANSI C57.12.01. The duration of the short-circuit current shall be at least one second.
2. Rectifier: All parts of the rectifier unit, including the terminal connections and buswork, shall be designed to withstand a maximum DC fault on the DC positive bus, without damage, for the time period required for the back-up protection to operate and open the AC circuit breaker.

F. Sound Levels: The audible sound level for the transformer rectifier assembly including its interphase transformer, housed in its enclosure with all panels bolted, measured 6 feet away from the assembly, within the substation enclosure, shall not exceed 55 dBA at 100 % load.

2.2 RECTIFIER TRANSFORMER

A. Type and Rating: Rectifier transformer shall be of solid cast, dry type (Class AA) construction mounted in a suitable, ventilated enclosure for indoor installation. The transformer shall be self-cooled, 26.4 kV primary, 3 phase, 60 Hz, suitable for indoor service at the duty cycles described herein.

B. Windings: High- and low-voltage windings shall be copper. The high-voltage winding shall be delta-connected, 125 kV BIL. The low-voltage windings shall be 45 kV BIL and shall be suitably connected for 12-phase rectification. The high- and low-voltage windings shall be cast as rigid coils. The windings must not absorb moisture, and shall be suitable for both storage and operation in adverse environments, including prolonged storage in 100 percent humidity at temperatures from -30 deg. C to 40 deg. C.

C. Temperature Limits: The transformer average temperature rise shall not exceed 80 deg. C when the transformer is operated at full nameplate rating, in the specified ambient temperature. The transformer shall not suffer any loss of life when operated at the specified duty cycle.

D. Impedance: The transformer impedance shall be selected to provide the rectifier output voltage specified.

E. Taps: The high-voltage windings shall have four full capacity taps, two above rated voltage in 1.25 percent steps and two below rated voltage in 2.5 percent steps, for deenergized tap changing. Tap

changing shall be by movable links. Tap connections shall be brought out and rigidly supported on a terminal board located in the transformer enclosure, and shall be accessible through a removable access panel. Access panels shall contain an ample sized, wired glass, gasketed observation window for observing the connected tap. Tap connections shall be clearly marked so that the tap selected is clearly identifiable through the observation window. The tap-changing links shall be securely bolted in position. The design of links and connectors shall make it impossible to short out sections of windings, or to select taps outside the prescribed range, by incorrectly connecting the links.

F. Terminations: The rectifier transformer shall be bus connected to the AC switchgear on the high voltage side and to the rectifier on the low-voltage side.

G. Accessories: All specified accessories and protective devices shall be provided in addition to the manufacturer's standard accessories. All contacts shall be electrically separate, and shall be suitable for operation at 125V DC. The transformer shall be provided with one of two types of winding temperature detection devices specified below.

1. The first type shall utilize three thermocouples; one embedded in each coil of the three-phase rectifier transformer. The thermocouples shall be connected to an electronic temperature-monitoring device, which automatically displays the temperature of the hottest phase, and shall be equipped with a manual override to display the temperature of any of the three phases.
2. The second type shall utilize a Resistance Temperature Detector (RTD), embedded in the transformer winding. The RTD shall be connected to a winding temperature gauge.
3. The temperature monitoring device or gauge shall be provided with a factory-set, two-stage contact. The first stage shall be a normally open contact, which closes on an increase in temperature to initiate annunciation. The second stage shall be provided with two contacts: one normally open contact which closes on an increase in temperature to initiate annunciation, and one normally open contact to initiate tripping of the station lockout relay included in the AC switchgear specified in 16345. If required, auxiliary power to the temperature-monitoring device shall be 120 V DC.
4. The temperature monitoring device or gauge shall be mounted for viewing from the outside of the transformer enclosure through a viewing window.

H. Construction: The transformer shall be so designed that parts, which require maintenance, are readily accessible. Louvers necessary for ventilation shall be designed to prevent entrance of moisture. The nameplate of the transformer shall either be clearly visible from outside the transformer enclosure or a duplicate nameplate shall be attached to the transformer enclosure.

1. Transformer Enclosure: The transformer shall be enclosed in a rigid, self-supporting and self-contained, electrically welded, indoor steel structure. The structure shall be sufficiently rigid to withstand maximum transformer short circuit currents. Bolt-on panels shall be provided on all sides to permit ready access for inspection and maintenance. The transformer mounting shall be designed to minimize undue vibration.
2. Base Construction: Base construction shall be designed for rolling or skidding in any direction. Provision shall be made for pulling along the centerlines perpendicular to each side. Jacking facilities shall be provided at each of the four corners of the base to permit insertion of rollers between floor and base. Base construction shall firmly secure the core to prevent relative motion of the core during shipment, handling, or seismic shock.
3. Lifting Hooks: Lifting hooks or eyes shall be provided on the transformer to facilitate lifting the unit.

I. Nameplate: The rectifier transformer shall be provided with a corrosion-resistant metal nameplate, marked in accordance with ANSI C57.18.

2.3 RECTIFIER

A. General: The rectifier shall be natural (convection) cooled, with 12 pulse rectification in accordance with

Circuit No. 31 of ANSI C.34.2, suitable for indoor service and for the duty cycle specified. Each rectifier section shall be a complete self-contained unit, including all connections and hardware from the AC bus in the transformer low-voltage winding to the DC bus in the DC switchgear. Each rectifier shall be a complete, operative assembly, consisting of silicon diodes, over-temperature monitoring devices, protective fuses, enclosure, and all other necessary and desirable components and accessories. Heat pipes with closed loop cooling liquid to dissipate heat from the diodes are not acceptable.

B. Construction: Physical isolation shall be provided between the rectifier section enclosure and the transformer enclosure as shown on the Drawings. Separate compartments shall be provided to isolate control and auxiliary circuits and functions from the 672 V DC buses and diodes. It shall be possible for all readings, control, or observations to be made without personnel exposure to live parts. Materials shall be chosen to preclude the possibility of corrosion or galvanic action interfering with proper operation or appearance during the life of the equipment. Completely compatible materials shall be used for diode cases, studs and heat sinks.

C. Surge Protection: The rectifier unit shall be equipped with voltage-surge suppressors to limit the reverse voltage across the silicon diodes within the peak reverse voltage rating of the diode, irrespective of whether the voltage transient appears in the alternating current or direct current power circuits. The voltage-surge suppressors shall consist of a resistor-capacitor network, and shall be connected across each leg of the circuit to reduce the magnitude of the line voltage surge.

D. Diodes:

1. General: Silicon diodes shall be hermetically sealed. The diodes shall be rated in accordance with EIA RS-282 and shall be geometrically similar and as symmetrical as practicable, to help balance the normal and surge electrical characteristics of each string.
2. Rating: The rectifier shall be capable of carrying the specified overloads and short-circuit loads with one parallel diode removed from each leg of the bridge without exceeding safe junction temperature on the active diodes. Each diode shall be capable of withstanding, at its maximum operating temperature during blocking periods, repetitive voltages having a value of 2.5 times its working peak reverse voltage without a permanent change in diode characteristics.
3. Current Balancing: The rectifier shall be designed to maintain current balance between parallel-connected diodes in each leg. This current-balancing scheme shall hold individual diode currents within their capabilities under all load conditions with one fuse per leg open. Current balancing shall not be achieved by use of selectively matched diodes.
4. Fuse Protection: Each diode shall be protected by a current-limiting fuse. The fuse shall disconnect the diode in case of failure and protect the other components of the rectifier. Fuses shall be sized to withstand all external DC faults or loading conditions. Operation of fuse shall provide visual indication in addition to diode failure alarm. A diode failure device shall be provided to detect loss of one or more diodes. Failure of one diode shall initiate annunciation, and failure of more than one diode shall initiate tripping of the appropriate rectifier lockout relay (86R) as specified in Section 16345. All connections to indicating switches and devices must be screw type terminals.
5. Diode Rating: Diodes shall be sized to provide a minimum number of parallel diodes, without the need for forced cooling.
6. Temperature Indication: A temperature indicator shall be provided to detect diode heat sink temperatures. The temperature indicator shall be provided with two-stage contact. The pickup point of each stage shall be adjustable, but shall be factory set so that, upon excessive temperature increase, the device shall initiate annunciation. With a greater temperature increase, the device shall initiate annunciation with normally open contact and tripping of the lockout relay included in the AC switchgear specified in Section 16345.

E. Buses and Bus Connections: Rectifier buses and bus connections shall be as specified in Section 16150. The buses shall be suitably braced to each other and to the enclosures with highstrength, non-tracking insulators. The buses shall be designed to safely withstand the available short-circuit currents without

damage to the bus or enclosure. The buses shall extend through the enclosure walls and shall be air-insulated from the enclosure. The positive and negative DC terminals of the rectifiers shall be bus-connected to the DC switchgear and negative enclosure. Separate compartments shall be provided to isolate the DC positive and negative buses. Aluminum buses may be used when in contact with heat sinks.

F. Rectifier Enclosure: The rectifier enclosure shall be indoor, metal-enclosed, ventilated structure. The enclosure shall be mounted on a rigid, self-supporting, structural steel framework, and shall have all principal members of its structure bonded together. The enclosure shall have protected openings to provide adequate ventilation for the components.

1. Doors: Hinged doors with viewing glass windows for all diodes and accessories shall be provided for front access to the rectifier. The inside doors shall have protected openings to facilitate ventilation for the rectifier.
2. Accessibility: Convenient access shall be provided for all normal maintenance and inspection. Doors shall be lockable and provided with key interlocks as specified herein.
3. Illumination: Externally switchable internal lighting shall be furnished, operated from 120 V AC-supply.
4. Enclosure Electrical Insulation: The rectifier enclosure shall be insulated from ground by the use of sheet insulation of a non-hygroscopic type, "Glastic" or approved equal. The enclosure shall be insulated from all secondary and auxiliary power and control circuits, with a minimum insulation rating of 2,000 V DC. The rectifier enclosure shall have all principal members of its structure bonded together and connected through a test switch for connection to the high-resistance ground relaying network specified in Section 16347.

G. Protective Devices and Metering: All protection furnished shall be coordinated to prevent false tripping or mis-operation. Relays and devices suitable for semiflush mounting shall be drawout type. Relays and devices subjected to 700 V DC shall be mounted on an insulating base and provided with dust covers. Auxiliary relays not suitable for semiflush mountings and not subjected to 700 V DC shall be surface-mounted and provided with suitable protective devices. All contacts shall be electrically separated. Each rectifier shall be provided with suitable protective devices to protect the overall equipment and assure continuity of operation. The devices provided shall prevent damage to the individual parts of the equipment due to short circuit, loss of cooling, transient voltage conditions and overloads. Protection and signal devices furnished shall include, but not be limited to, the devices specified. Contacts shall be provided on the protective devices to permit external annunciation and circuit breaker tripping as specified.

H. DC Main Circuit Breakers

1. The DC main circuit breakers shall be rated for maximum voltage of 800 volts, and shall be the frame size as shown on the drawings.
2. The DC circuit breakers shall satisfy the requirements as specified in section 16347, 2.4.

I. Key Interlocks: Mechanical "Kirk key" interlocks or approved equal shall be furnished on the rectifier access door(s), the AC circuit breaker, the negative Disconnect switch and the DC main circuit breaker. The interlocks shall satisfy the requirements specified in Section 16345.

J. Radio Frequency Interference: Radio frequency interference generated by the rectifiers shall be kept to a minimum by the provision of suppression devices across each leg of the diode bridge.

2.4 SPARE PARTS

A. The following spare parts shall be furnished.

1.	Rectifier diodes	4
2.	Rectifier diode protection fuses	4
3.	RTD temperature transducers	2 sets

4. Interposing transformer (if used in design) 1

PART 3 - EXECUTION
(Not Applicable)

END OF SECTION

SECTION 16345

AC SWITCHGEAR

PART 1 - GENERAL

1.1 SCOPE

This Specification Section covers the furnishing of AC switchgear assemblies required for each of new traction power substation.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - C37.04 Rating Structure for AC high-Voltage Circuit Breakers Rated on Symmetrical Current Basis
   - C37.06 Preferred Ratings and Related Required Capabilities for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
   - C37.09 Test Code for AC High-Voltage Circuit Breakers Rated on a Total Current Basis
   - C37.11 Requirements for Electrical Control for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.
   - C37.20.2 Metal-Clad and Station Type Cubicle Switchgear
   - C37.90 Relays and Relay Systems Associated with Electric Power Apparatus
   - C39.1 Requirements for Electrical Analog Indicating Instruments
   - C57.13 Requirements for Instrument Transformers
2. National Electrical Manufacturer's Association (NEMA):
   - SG 5 Power Switchgear Assemblies

PART 2 - PRODUCTS

2.1 GENERAL

The AC switchgear assemblies shall form dead front, free standing lineups. The switchgear shall be metal clad type. The switchgear shall be used to supply and control AC power to the transformer rectifier units and supply AC auxiliary power to the substation. AC disconnect switch is in separate enclosure. Unless otherwise shown, the switchgear shall conform to or exceed the requirements of ANSI C37.20 and NEMA SG 5.

2.2 RATINGS

A. The AC switchgear shall have the following minimum ratings:

1.	Nominal voltage (kV)	26.4
2.	Maximum voltage (kV)	27.3
3.	Insulation level, 60 Hz withstand (kV)	60
4.	Insulation level, impulse withstand voltage (kV)	125
5.	Continuous current (Amperes)	600

2.3 CIRCUIT BREAKERS

A. The high-voltage AC circuit breaker shall be sulfur hexafluoride (SF6) or vacuum type, draw-out. A two-stage pressure switch shall be provided for SF6 circuit breakers, which shall operate when the SF6 gas pressure falls below the normal value and shall initiate local and supervisory alarm. All circuit breakers of the same type and rating shall be completely interchangeable.

1. Ratings: The minimum ratings of the AC circuit breaker shall be as follows:

a.	Service voltage (kV)		26.4
b.	Maximum voltage (kV)	27.3	
c.	Frequency (Hz)	60	
d.	Continuous current (Amperes)	600	
e.	Insulation level, 60 Hz withstand (kV)	60	
f.	Insulation level, impulse withstand voltage (kV)		125
g.	Available Fault Current 3-phase line to ground (kA, rms. symmetrical)	35	
h.	Available Fault Current single line to ground (kA, rms symmetrical)	20	
i.	Interrupting time (cycles, max.)	15	

2. Operating Mechanism: The circuit breaker control circuits shall operate from a 125V DC source. The operating circuit shall successfully close the breaker over a voltage range of 90 to 140 V DC and trip the breaker over a voltage range of 70 to 140 V DC. The tripping mechanism shall be provided with a shunt trip coil. The circuit breaker shall be electrically and mechanically trip-free. The operating mechanism shall be non-pumping. A white indicating light shall be located on the control panel of the circuit breaker unit to indicate that the stored-energy closing mechanism is charged. The stored energy closing mechanism shall be motor operated and shall automatically charge itself after closing the breaker. The circuit breaker shall be suitably equipped for manual closing using the stored-energy mechanism, for emergency closing in case of failure of the normal electrical closing circuit.
3. Racking Mechanism: The circuit breaker compartment shall contain a manual racking mechanism for horizontal drawout. Interlocks shall be provided to prevent racking the breaker in or out with the breaker closed. When the breaker element is in the fully racked-out position, the circuit breaker, complete with its operating mechanism, shall be capable of being withdrawn from the housing. Positive stops shall be provided to prevent over-travel. Guides shall be furnished to insure proper alignment.
4. Lifting Crane: A portable hoist or a lifting crane and truck shall be provided for one-man installation and removal of circuit breaker.
5. Grounding: When the breaker is in the connected and test positions, the case and frame shall be grounded by means of a positive contact with a copper ground bus. The breaker ground shoe shall connect the breaker frame to the ground bus prior to engagement of the primary breaker terminals.
6. Interlocks: An interlock shall automatically discharge the stored-energy mechanism of the circuit breaker prior to withdrawal of the circuit breaker from its unit. Necessary additional auxiliary devices shall be provided to protect against inadvertent closing of the circuit breaker.
7. Circuit Breakers Positions: Provisions shall be made for moving each breaker to "connected", "test", and "disconnected" position. In the "connected" position, both the main breaker contacts and the auxiliary contacts shall be in full contact and the breaker shall be in position for normal operation. In the "test" position, the main breaker contacts shall be open and separated by a safe distance and the auxiliary contacts shall be in full contact. In the "disconnected" position, both sets of contacts shall be open and separated by a safe distance and automatically operated shutters shall cover the exposed part of the AC bus. Mechanical interlocks shall be provided to prevent moving the circuit breaker in or out of the "connected" position when the circuit breaker main contacts are in the closed position. An indicator shall be provided to show the circuit breaker in

"connected", "test", or "disconnected" positions. Each breaker compartment and circuit breaker combination shall be provided with mechanical interlocks, which shall prevent closing the circuit breaker manually unless the breaker is in the "test" or "disconnected" position. The circuit breaker shall be prevented from closing electrically, unless the circuit is in the "connected" position with the compartment door fully closed and latched, or in the "test" position.

8. Auxiliary Contacts: Not less than four electrically separate sets of reversible auxiliary contacts shall be provided, in addition to those required for the circuit breaker control and annunciator circuits. All auxiliary contacts shall be operated by the breaker mechanism in both the "operating" and "test" position. All spare auxiliary contacts shall be wired to the outgoing terminal blocks.
9. Operations Counter: A four-digit, nonresettable, register-type operations counter shall be provided on the circuit breaker to record tripping operations. The counter shall be visible from the outside without the need for opening the door of switchgear cubicle.
10. Key Interlocks: Mechanical "Kirk Key" interlocks or approved equal shall be furnished between the AC circuit breaker, DC main circuit breaker, the rectifier access door(s), specified in Section 16325; and the negative disconnect switch.
    1. The interlocking shall allow opening of the rectifier access door(s) and operation of the DC negative disconnect switch only after the AC circuit breaker and DC main circuit breaker have been opened and locked in the open position.
    2. Closing of the AC circuit breaker and DC main circuit breaker can be allowed only after closing the rectifier door(s), and the negative disconnect switch.
    3. A complete Kirk-Key interlocking scheme with a detailed sequence of operation shall be provided by contractor and approved by King County.

2.4 AUXILIARY EQUIPMENT COMPARTMENT

A. The auxiliary equipment compartment shall consist of a single pole isolating switch with fuse, single phase station service transformer, surge arresters, instrument transformers, receptacles, and other accessories as shown on the Drawings and as described herein.

B. Switch Fuse: A single pole switch with fuse shall be mounted in a trunnion type arrangement in the auxiliary compartment. The switch shall be capable of interrupting the magnetizing current and load current of the station service transformer. Access to the compartment shall be by removal of one external hinged and bolted panel, which shall automatically disconnect power to the station service transformer. The compartment shall be equipped with a gasketed wire glass window to allow visual inspection of the switch position from the substation interior. Alternate arrangements are subject to approval by King County.

C. Station Service Transformer: The transformer shall be single phase, 120-240 volts secondary with +5 percent primary taps in 2-1/2 percent steps. The BIL of the primary winding shall be 125 kV. The station service transformer shall be rated to provide 5 kVA spare capacity, in addition to the maximum auxiliary load requirement of the traction substation equipment. The minimum kVA rating of the station service transformer shall be 10 kVA.

D. Surge Arresters: High voltage surge arresters shall be provided as shown on the Drawings. The surge arresters shall be metal-oxide, intermediate type, rated for 26.4 kV service.

E. Instrument Transformers: Instrument transformers shall conform to ANSI C57.13, NEMA EI 2, and NEMA EI 21.
    1. Current Transformers: Current transformers shall be molded rubber or epoxy construction, wound or bushing type. Current transformers shall be capable of withstanding the thermal and mechanical ratings of the circuit breaker. Transformers shall be insulated for 38 kV class, with impulse withstand of 125 kV. Secondary terminal blocks shall have covers with integral shorting bars. Secondary wiring shall be run to readily identifiable terminal block points in the control

compartment. Terminal block points shall also have integral shorting bars for the current transformer leads. Current transformers shall be relaying accuracy, under the burdens imposed by the devices as specified.

2. Potential Transformers: Potential transformers shall be molded rubber or epoxy construction. Transformers shall be insulated for 38 kV class, with impulse withstand of 125 kV. Primary and secondary circuits of potential transformers shall be fused by means of non-renewable cartridge type fuses. Secondary circuit fuses shall be installed in the low-voltage circuits and shall be located to permit replacement when the switchgear is in operation. All potential transformers shall be of relaying accuracy for the burdens imposed by the devices specified in the Drawings, and shall be capable of carrying rated load continuously without excessive heating. Both the primary fuses and the potential transformers may be fix mounted.

F. The auxiliary equipment compartment shall be designed for high voltage cable connection entering from below.

2.5 ENCLOSURES

A. The AC switchgear assemblies shall consist of rigid, self-supporting and self-contained electrically welded steel enclosure. The enclosure shall be sufficiently rigid to support equipment under normal loads and short circuit conditions.

1. Compartments: Each compartment shall be provided with a separate hinged door or a removable panel for servicing without exposing circuits in adjacent compartments. Adequate provisions shall be made for escape of gases from the breaker compartment by means of louvered vent openings covered with grilles, and arranged in such a way that hot gases, hydrogen or other materials cannot be discharged in a manner hazardous to personnel.
2. Doors: Hinged door or full-height drawout panels shall be provided for front access to circuit breaker, instruments and terminal blocks. Where rear access is required, hinged doors or hinged screw-panels shall be provided and coordinated with weatherproof doors in the outdoor enclosure. Relays, meters, instruments and control devices shall be mounted on the front doors. The doors shall be formed of sheet steel and shall be properly reinforced to prevent distortion by suitable flanges and stiffening members. Hinges shall be heavy-duty stainless steel. Full-height doors shall be securely fastened in the closed position with a minimum of three metal latches, easily opened without the use of tools. The doors shall be provided with a handle, and stops and latches to hold them securely in the open position.
3. Protective Shutters: Each circuit breaker cubicle shall be provided with protective metal shutters which automatically close and cover live high-voltage terminals as the removable element of the breaker is racked out of the cubicle.
4. Refer to Section 16150 for general enclosure requirements.

2.6 BUSES AND CONNECTIONS

A. Bus material and connections shall be as specified in Section 16150. The continuous current rating of all main bus and circuit breaker connections shall be at least 600 Amperes. All buses and bus connections shall be adequate to withstand all thermal and mechanical stresses associated with short circuit currents equal to the momentary and three second rating of the circuit breaker being supplied.

1. Insulation: Buses and bus connections shall be insulated with anti-hygroscopic, track-resistant, non-flammable, molded insulation or by other approved methods. The method of bus insulation and the insulating material shall conform to ANSI C37.20.
2. Bus Supports and Bushings: The buses shall be supported by porcelain, cast-resin or approved equal bushings of sufficient strength to withstand, without damage or permanent distortion, all stresses produced by short circuit currents equal to the momentary and three second ratings of the circuit breakers.
3. Ground Bus: A copper ground bus having a momentary rating not less than the highest momentary rating of the circuit breaker shall extend the full length of the switchgear assembly.

Each housing shall be grounded directly to this bus. The frame of the circuit breaker shall be grounded through a ground contact shoe at all times, except when the primary disconnecting devices are separated and the shutters closed. At all points of connection between the ground bus and the structure, all nonconductive coatings shall be removed.

2.7 PROTECTIVE RELAYS, METERS AND CONTROLS

A. General: Meter, instrument and relay circuits shall be furnished, wired and connected as shown in the Drawings. Additional components such as auxiliary relays, isolating diodes and similar devices not shown, but required for a complete installation, shall be provided.

B. Protective Relays:

1. Arrangement and Mounting: All protective relays of the induction disc or solid state type shall be semiflush mounted, back-connected, adjustable, drawout type. Induction type shall have integral test switches. Protective relays shall have rustproof metal or high impact plastic rectangular cases, finished in dull black. Clapper-type relays or auxiliary relays shall be GE type HGA, HFA or Westinghouse type SG or approved equal and mounted on a fixed portion of the structure. Protective relays shall be furnished with visible targets, a hand reset for the target, and seal-in units. Contacts and adjusting devices shall be readily visible, accessible, and adjustable from the front of the relay. The relays shall have silver-to-silver, nonbouncing contacts. All relays shall conform to the applicable portions of ANSI C37.90.
2. Rectifier Fault Protection (Device 50/51): Instantaneous and short time overcurrent relays, Basler Type BE1, or equal, shall be furnished, set to operate for faults in the rectifier, the DC bus fed from the AC side and close-in line faults with time delay. Should the overcurrent relays furnished for the above requirments not be adequate to protect the transformer rectifier against overloads; an additional relay for transformer overload shall be provided. The AC instantaneous and time overcurrent realays shall trip the station lockout relay.
3. Ground Fault Protection (Device 50N/51N): Instantaneous and long time overcurrent relays, Basler BEQ-51, or equal, shall be furnished and set to operate for ground faults in the rectifier transformer. This relay shall trip the station lockout relay.
4. Station Lockout Relays (Device 86): High-speed, multi-contact, hand reset, lockout relays shall be furnished. The lockout relays shall be provided with mechanical targets, which indicate whether the relays are in the tripped or reset position. The lockout relay shall be tripped from protective relays specified herein and in other Specification Sections; and from the emergency shutdown pushbutton furnished and installed on the substation doors as specified in Section 16385. Operation of the lockout relays shall trip the high- voltage AC circuit breaker and all DC feeder breakers. Lockout relay shall be General Electric Type HEA, Westinghouse Type WL, or equal.
5. Undervoltage Relay (Device 27): A three-phase undervoltage relay, or two single-phase undervoltage relays connected in two of the three phases, shall be provided to detect loss of AC voltage on any of the three phases in the incoming AC line as shown on the Drawings. Operation of these relays shall trip and prevent closing of the transformer rectifier AC circuit breakers.
6. A complete protective device coordination shall be completed by the contractor and submitted to King county for approval as specified in section 16010.

C. Instruments and Meters: Instruments and meters shall conform to ANSI C39.1.

1. Ammeters and voltmeters shall be switchboard type GE DB-40 or Crompton or approved equal, with 270-degree scales. The cases shall be dust tight, with dull-black finish, and covered with a nonreflecting glass window. The accuracy of all instruments shall be within one percent of full-scale reading. Voltmeters shall be rated 0-150 volts, for use with 26,400 volt to 110-volt potential transformers with a full-scale range of 36,000 volts. Ammeters shall be five ampere, transformer rated. Scales shall be of a suitable range, equal to the associated current transformer's primary rating.

D. Control Circuits:

1. The Contractor shall provide a complete and operable system. Additional components, such as auxiliary relays, terminal blocks, and other auxiliary devices shall be provided.
2. Control Switches shall be provided mounted in the front panel of the circuit breaker units to provide local control for the circuit breakers. All control switches shall be rotary type, suitable for switchboard mounting with a rectangular, front-panel engraved escutcheon plate showing switch positions. Each switch contact shall be silver-to-silver, self-cleaning, readily renewable type, and shall have adequate insulation and contact surface. All breaker control switches shall be spring-return to normal with pull and lockout position, shall have pistol grip handles or approved equal, and shall be provided with mechanical indicating devices to show the last operation of the switch. All instrument and local/remote selector switches shall have round knurled handles. Lockout relays shall have oval handles. Switches shall be installed so mating contact surfaces are vertical. The switches shall be General Electric type SB-l, Westinghouse type W-2, or approved equal.
3. The circuit breaker positions "open" or "closed" shall be indicated by green and red indicating lamps mounted in the front panel of the circuit breaker units.
4. A selector switch for remote/local operation shall be provided with each circuit breaker. Each switch shall have two sets of spare contacts. The selector switch shall be General Electric Type SB-1, Westinghouse Type W-2, or approved equal.
5. Test switches shall be provided for all instrument transformers (both current and potential) as shown on the Drawings. Each test switch group shall be mounted in a semiflush case of uniform size, capable of holding at least six current positions and four voltage positions. A convenient, dull black dust cover shall permit covering the test switches and contacts when they are not in use. The test switches shall be Westinghouse type FT-1, General Electric type PK-2, or approved equal. Rotary switches are not acceptable.
6. Nameplates and mimic bus shall be provided as specified in the Section 16150.

2.8 SPARE PARTS

A. In addition to the contractor reccommended spare parts the following spare parts shall be provided for use with the AC switchgear sections.

1. Two of each type of AC protective and auxiliary relays.
2. Two of each type of AC switchgear control and auxiliary switches.
3. Two of each type of AC indicating meters.
4. 12 of each type of indicating lamps.
5. 12 of each type of fuses for AC and DC control circuits.
6. Two 26kV AC circuit breakers.
7. One each potential transformer.
8. One each current transformer.
9. Two sets of potential transformer fuses.

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16347

DC SWITCHGEAR AND NEGATIVE ENCLOSURES

PART 1 - GENERAL

1.1 SCOPE

This Specification Section covers the furnishing of DC switchgear assemblies and negative enclosures. The equipment shall be delivered as completely engineered, fabricated, assembled, inspected, and tested units ready for connection of power cables by others.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - C37.14 Low-Voltage DC Power Circuit Breakers Used in Enclosures
   - C37.16 Preferred Ratings, Related Requirements, and Application Recommendations for Low-Voltage Power Circuit Breakers and AC Power Circuit Protectors
   - C37.17 Trip Devices for AC and General-Purpose DC Low-Voltage Power Circuit Breakers
   - C37.20.1 Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
2. National Electrical Manufacturer's Association (NEMA):
   - SG 3 Low-Voltage Power Circuit Breakers

PART 2 - PRODUCTS

2.1 GENERAL

A. The DC switchgear lineup shall form a lineup of dead front, metal-enclosed, free standing enclosures suitable for indoor service. The DC switchgear shall include all equipment, connections and hardware from the rectifier positive bus, to the terminal pads for connection of the positive DC feeder cables to the DC disconnect switch assembly. The circuit breakers bays shall each include a drawout, single-pole, DC power circuit breaker, DC positive buses and bus connections, positive feeder cable terminal connectors, indicating lights, terminal blocks, protective and auxiliary relays, current shunts, control circuitry, wiring, and all other devices shown or necessary to make a complete and operable assembly.

B. The negative enclosure shall be metal-enclosed, free standing, deadfront, suitable for indoor application. The negative enclosure shall be a complete self-contained unit, including all bus connections and hardware from the rectifier negative bus to the terminal pads for connection of the negative DC feeder cables to the overhead trolley system. The negative enclosure shall include all the equipment and devices shown or necessary to accommodate the requirements of the traction power system for trolley bus operation.

C. Unless otherwise indicated, the switchgear shall conform to ANSI C37.14, ANSI C37.16, ANSI C37.17, ANSI C 37.20, and NEMA SG3. The switchgear shall serve as the control and protective equipment for the supply of DC power to the trolley coach overhead contact system.

2.2 RATINGS

A. The DC switchgear shall have the following ratings:

1. Nominal voltage (volts, DC) 700

2.	Maximum voltage (volts, DC)	800
3.	Insulation level, 60 Hz withstand (kV)	3.7
4.	DC withstand (kV)	5.2

2.3 DC SWITCHGEAR ENCLOSURES

A. The DC switchgear shall be rigid, self-supporting, and self-contained, metal-enclosed, conforming to applicable portions of ANSI C37.20, and to the requirements. specified herein. The breaker enclosures shall be suitable for accommodation of drawout circuit breakers and shall include stationary disconnecting device contacts and supporting rails for the circuit breakers. The design shall allow the circuit breakers to be easily drawn in or out of their housing and connected or disconnected from the buses and auxiliary circuit by means of self-aligning, self-coupling primary and secondary disconnecting devices. A multi-conductor cable plug type for the connection of the circuit breaker auxiliary contacts is acceptable to King County. Enclosure surfaces exposed to arcs or ionized gases shall be lined with flame resistant, insulating material.

1. Doors: Hinged doors or full width drawout panels shall be provided for front access to the circuit breakers, instruments and terminal blocks. Relays, meters, instruments and control devices shall be mounted on the front doors. The doors shall be provided with stops and latches to hold them securely in the open position. Circuit breaker compartment doors shall be mechanically interlocked to prevent opening when the breaker is closed.
2. Dimensions and Arrangement: Dimensions and arrangement of the switchgear shall be such as to provide adequate clearance to ground. The dissipation of ionized gas from the circuit breaker arc chutes shall not be a hazard to personnel, the structure or objects, when interrupting rated short-circuit current at rated maximum voltage. Adequate provisions shall be made for release of gas from the units to the outside by means of suitable stacks, louvered vent openings or vent openings covered with grilles. Openings shall be arranged in such a way that hot gases or other materials cannot be discharged in a manner hazardous to personnel.
3. Enclosure Insulation: The switchgear enclosure shall be insulated from ground by sheet insulation as described for the rectifier in Section 16325, Paragraph 2.3.F.4.
4. Shutters: Metal shutters shall be provided in each breaker compartment, which shall operate automatically to completely cover the orifices containing the stationary contacts when the circuit breaker is withdrawn to the "disconnected" or "test" positions, and uncover the orifices in the "connected" or in-service position.

2.4 CIRCUIT BREAKERS

A. Each DC switchgear line up shall consist of the number of DC breakers as shown on the Drawings.

1. Rating: The DC circuit breakers shall be semi-high speed, rated in accordance with ANSI C37.14 and C37.16, except as modified herein. The DC circuit breakers shall be rated for maximum voltage of 800 volts, and shall be the frame size shown on the Drawings. The minimum ratings for the DC circuit breakers shall be as follows:

Frame Size and Trip Device (Amperes)	As shown on drawings
Momentary and Peak Current (Amperes)	50,000
Sustained Current (Amperes)	30,000
Insulation Level, 60 Hz withstand (V)	3,700

2. Interrupting Rating: The semi-high speed DC circuit breaker shall be capable of interrupting all values of current from 0 to 100% of its rated capacity (at rated voltage), including that of the peak current and that of the circuit energy criteria specified, with the instantaneous release set at 400 percent and irrespective of whether current flow is in the forward or reverse direction. The circuit breakers shall also be capable of interrupting, at rated voltage, all values of current from 0 to 100 per cent of their rating in the reverse direction following an interruption at their maximum short circuit rating in the forward direction.
3. Arc Chute: Each circuit breaker shall have an arc chute consisting of arc chambers provided to house the main contacts and confine and direct opening arcs until extinguished.

4. Contact Surfaces: Contact surfaces of the moving and stationary contact members of the main contacts shall be silver, non-welding silver alloy or equivalent, which combines high conductivity, and necessary arc resistant properties.
5. Removable Elements: Removable elements of the same type and rating shall be completely physically and electrically interchangeable. Removable elements not of the same type or rating shall not be interchangeable.
6. Lifting Crane: A lifting crane and truck shall be provided in each substation for the installation and removal of the circuit breakers for one-man operation.
7. Operating Mechanism: Each circuit breaker shall have a shunt-trip device with the necessary auxiliary control equipment. Each breaker shall be electrically operated at 125 V DC nominal control power supply. Each breaker shall be electrically and mechanically trip free, non-pumping, quick-make and quick break, with mechanism ensuring full contact pressure until time of opening. The circuit breaker closing mechanism shall be operated by a stored energy device such as a spring which can be charged either by hand or electrically by a motor-operator that can be controlled by local or remote control. The status of this charging/operating mechanism shall be monitored with a white light on the control panel to indicate that the closing mechanism is charged. Additional contacts shall be provided for remote indication. Closing of the circuit breaker shall be prevented in the event of low or unavailable trip control power. The operating mechanism shall successfully close over a voltage range of 90 to 140 V DC and trip the breaker over a voltage range 70 to 140 V DC.
8. Circuit Breaker Positions: Provisions shall be made for moving each breaker to a "connected", "test", and "disconnected" position. In the "connected" position, both the main breaker contacts and the auxiliary contacts shall be in full contact and the breaker shall be in position for normal operation. In the "test" position, the main breaker contacts shall be open and separated by a safe distance and the auxiliary contacts shall be in full contact. In the "disconnected" position, both sets of contacts shall be open and separated by a safe distance and automatically operated shutters shall cover the exposed part of the DC bus. Mechanical interlocks shall be provided to prevent moving the circuit breakers in or out of the "connected" position when the circuit breaker main contacts are in the closed position. An indicator shall be provided to show the circuit breaker in "connected", "test", or "disconnected" positions. Each breaker compartment and circuit breaker combination shall be provided with mechanical interlocks, which shall prevent closing the circuit breaker manually unless the breaker is in the "test" or "disconnected" position. The circuit breaker shall be prevented from closing electrically, unless the circuit is in the "connected" position with the compartment door fully closed and latched, or in the "test" position.
9. Manual Operation: Each circuit breaker shall be provided with mechanical means for manually tripping the circuit breaker when in the "test" and "connected" positions. This function shall be available with the compartment door closed. An indicator, visible when the door is closed, shall be provided to show when the circuit breaker is in the "open" and "closed"position.
10. Spare Auxiliary Contacts: Not less than four spare, electrically separate sets of reversible auxiliary switch contacts shall be provided, in addition to those required for the circuit breaker control and annunciation circuits, for use as "a" or "b" contacts. All auxiliary switch contacts shall be operated by the breaker mechanism in both the "connected" and the "test" positions. All auxiliary switch contacts, both used and spare, shall be wired to terminal blocks.
11. Operations Counter: A three digit, non resetable register type operations counter shall be provided on each circuit breaker to record tripping operations.
12. Breaker Position Indicator: The breaker positions "open" or "closed" shall be indicated by mechanized indicating targets visible with the breaker compartment door closed.

2.5 NEGATIVE ENCLOSURES

A. General: The negative enclosures shall include the rectifier negative disconnect switch, bus and bus connections, surge arresters, shunts, meters and other devices required to make a complete and operable assembly.

B. Enclosures: The negative equipment shall be enclosed in rigid, self-supporting and self-contained electrically welded steel structures. Hinged doors shall be provided for front access to the negative equipment. Refer to Section 16150 for general enclosure requirements.

C. Disconnect Switches: The negative disconnect switches shall be manually operated, single pole, single throw, bolted pressure type, solid copper blades with silver plated contacts, rated at 800 V DC. The switches shall be equipped with insulated operating handles. Ratings of the disconnect switches are shown on the Drawings.

D. Key Interlocks: Mechanical "Kirk Key" interlocks shall be furnished on the negative disconnect switches that satisfies the interlocking requirements specified in Section 16345.

2.6. BUS AND BUS CONNECTIONS

A. General: Bus material and bus connections shall be as specified for busways in Section 16150. The bus shall be capable of carrying the loads required of the specified duty cycles without exceeding the allowable temperature rise specified in ANSI, IEEE, and NEMA standards. The bus shall be furnished for the full length of the switchgear assembly. The bus and bus connections shall be of adequate strength to withstand all thermal and mechanical stresses associated with short circuit currents equal to the interrupting rating of the circuit breakers.

B. Insulation: The bus shall be bare, mounted on barrier-type insulation or post type insulators of sufficient strength to withstand, without damage or permanent distortion, all stresses produced by short-circuit currents equal to the interrupting rating of the circuit breakers.

C. Negative Bus: A single conductor 700 V DC negative bus, No. 6 AWG or larger, shall be furnished the full length of each switchgear assembly. The insulation shall be as indicated for 700 V DC control wiring. The negative bus shall be terminated on a terminal block for connection to the rectifier negative. The bus shall be tapped at each cubicle served and extended to the load measuring circuit.

2.7 CABLE CONNECTIONS

A. Positive feeder cables shall pass through the top of the switchgear. Provisions shall be made to accommodate the required number of feeder cables. Space and contact surfaces shall be provided for pulling, securing and terminating the feeder cables. NEMA standard connectors shall be furnished for all feeder cables.

B. Negative feeder cables shall pass through the bottom of the negative enclosure. Provisions shall be made to accommodate the required of feeder cables. Space and contact surfaces shall be provided for pulling, securing and terminating the negative feeder cables. NEMA standard connectors shall be furnished for all feeder cables.

2.8 PROTECTIVE DEVICES AND METERING

A. General:

1. Meter, instrument and relay circuits shall be furnished, wired and connected as shown on the Drawings. Additional components such as auxiliary relays, isolating diodes and similar devices not shown, but required for a complete installation, shall be provided.
2. Arrangement and Mounting: Devices shall be arranged to be conveniently accessible and visible. The grouping shall be neat, modular and logical, with related functions in close proximity. Devices shall be plumb and square with the lines of the panel, and mounted as recommended by the manufacturer. Care shall be taken to avoid wiring congestion. All auxiliary devices shall match in general appearance, as far as possible, with frames of a matching dull-black finish. All devices on the panel face shall be semi-flush mounted. Devices of the same general type shall be

manufactured by the same company and shall be similarly arranged and mounted.

3. Programmable Logic Controllers (PLC) to satisfy the protection, control and metering requirements specified herein are not acceptable to King County.

B. Protective Relays:

1. Forward Current Trip Devices (Devices 76F): Each DC circuit breaker shall be provided with a direct acting, instantaneous overcurrent trip device. The trip device shall be adjustable between 100 and 400 percent of the circuit breakers continuous current rating.
2. Reverse Current Relay (Device 32): A reverse current relay shall be furnished on each DC main Circuit Breaker. The relay shall trip the station lockout relay on reverse current and shall be adjustable between 50 and 100 percent of the feeder circuit breaker continuous current rating. The reverse current relay shall be a SWARTZ type 32 as manufactured by SMC corp.
3. Feeder Breaker Overcurrent Relay (Device 76): Each DC feeder breaker cubicle shall be provided with a solid state overcurrent relay, device No. 76, with unidirectional instantaneous, short-time, long time, and rate of rise characteristics. The relay shall be suitable for operation with 125 volt DC control power and have an isolated current sensing input circuitry compatible with the appropriate current shunt, operating at 700 V DC above ground potential. The relay shall be a SWARTZ Type 76, as manufactured by SMC Corporation. It should be noted that no substitute for the specified overcurrent relay would be acceptable to King County. The Contractor shall incorporate this relay with his equipment as required to provide a complete operating system. The Contractor's equipment warranty shall cover the use of this type of relay with his equipment.
4. Bi-Directional Overcurrent relay (Device 76BD): The DC bus tie breaker shall be provided with a solid state overcurrent relay, device No. 76, with Bi-directional instantaneous, short-time, long time, and rate of rise characteristics. The relay shall be suitable for operation with 125 volt DC control power and have an isolated current sensing input circuitry compatible with the appropriate current shunt, operating at 700 V DC above ground potential. The relay shall be a SWARTZ Type 76, as manufactured by SMC Corporation. It should be noted that no substitute for the specified overcurrent relay would be acceptable to King County. The Contractor shall incorporate this relay with his equipment as required to provide a complete operating system. The Contractor's equipment warranty shall cover the use of this type of relay with his equipment.
5. Automatic Reclosing Equipment (Device 82):
    a. Each DC feeder circuit breaker shall be provided with automatic reclosing equipment including a load-measuring circuit to prevent circuit breaker closing with a fault on the overhead trolley wires. The load-measuring circuit shall include a load-measuring relay (Device 82), voltage sensing transducer or DC/DC converter, load-measuring contactors (Device 29), 100 Ohm load measuring resistor adequately sized to prevent overheating, adjustable time-delay relay, and associated accessories.
    b. The load measuring circuit shall be initiated by a closing signal from either the local control switch or supervisory system, or when the circuit breaker is tripped as specified in subparagraph d below.
    c. The load-measuring circuit shall operate for both stub and tied conditions. A stub condition occurs when the trolley wire system is fed by one substation without backfeed from an adjacent substation. A tied condition occurs when the system is fed from two substations.
    d. Automatic reclosing may only be permitted when a circuit breaker is tripped by the direct acting overcurrent trip device and the overcurrent relay, Device No. 76. Reclosing shall not be permitted when a circuit breaker is tripped by local control switch, supervisory control, manual pushbutton, or station lockout relay (Device 86).
    e. The scheme shall be designed to prevent initiating the load measuring circuit when the circuit breaker is in the closed or disconnected position. Antipump circuit shall be provided.
    f. The load measuring scheme shall be disabled when the circuit breaker control switch is in the pull and lockout position.
    g. The relay shall be a SWARTZ type 82 as manufactured by SMC Corporation. No

substitutes will be accepted.

h. Voltage Transducer shall be a SWARTZ Type... 0-800 VDC = 0 to 1mA, as manufactured by SMC corp, or approved equal.

6. Enclosure Ground Relaying: (Device 64R/64MR): The DC switchgear, rectifier cubicle, and negative enclosure shall be insulated from each other, and from the substation enclosure walls and floor, and connected to a separate bus through isolating links. This bus shall be connected to station ground bus through a high resistance ground relay, SWARTZ type 64 as manufactured by SMC corp. A panel-mounted voltmeter shall be connected in parallel with the enclosures and the station ground. The relay shall detect any part of these enclosures, which may become energized in the event of a fault between the enclosure and any of the current carrying components. The ground relay system shall be provided with a contact to initiate annunciation upon the recurrence of any of the following:
   a. Enclosure in contact with ground.
   b. Enclosure in contact with the negative of the DC system.
   c. Malfunction of the ground relays.
   d. Loss of potential between the DC equipment enclosures and station ground.

   The ground relay system shall also be furnished with contacts to initiate alarm and tripping of the station lockout relay when the positive of the DC system gets in contact with any part of the enclosure.
7. Negative Overvoltage Relay (Device 64V): An overvoltage relay shall be provided to detect DC voltage in the negative bus to ground. The relay shall have a pick up value adjustable from 45 to 300 V. The relay shall initiate external annunciation.
8. Emergency Trip Control: Provision shall be made for each feeder breaker control circuit to accommodate remote tripping from the emergency trip device stations. Activation of the emergency trip device at any mainline location shall trip the trolley wire feeder breaker feeding the power zone covered by that emergency trip device.

C. Instruments and Meters: Ammeters, voltmeters and shunts shall be furnished as shown on the Drawings. Meters shall be switchboard type with 250-degree scales. DC ammeters shall be zero-centered. The cases shall be dust tight, with dull black finish and covered with a non-reflecting glass window. The accuracy shall be within one percent of full-scale reading. Ammeters and voltmeters connected to transducers shall be rated 0-1MA with scales suitable to the application. An analog chart recorder shall be provided to make permenate record of the negative to earth-ground current, as shown on the drawings. The chart recorder shall be permanently mounted in a convenient and accessible location.

D. Control Circuits:
1. The Contractor shall provide a complete and operable system. Additional components, such as auxiliary relays, terminal blocks, and auxiliary devices shall be provided where required or desirable.
2. Control switches shall be provided mounted in the front panel of the circuit breaker units to provide local control for the circuit breakers. All control switches shall be rotary type, suitable for switchboard mounting, with a rectangular, front panel engraved escutcheon plate showing switch positions. Each switch contact shall be self cleaning, readily renewable type, and shall have adequate insulation and contact surface. All breaker control switches shall be spring return to normal, with pull and lockout position, shall have pistol grip handles or approved equal, and shall be provided with mechanical indicating devices to show the last operation of the switch. The control switches shall be General Electric Type SB-1, Westinghouse Type W-2, or equal. Switches shall be installed with mating contact surfaces vertical.
3. The circuit breaker positions "open" or "closed" shall be indicated by green and red indicating lamps mounted in the front panel of the circuit breakers units. In addition, the DC disconnect switches specified in Section 16362 shall be provided with position indications "open" and "closed", with green and red indicating lamps mounted in the front panel of the corresponding DC feeder circuit breaker.

4. A selector switch for remote/local operation shall be provided with each circuit breaker. Each switch shall have two sets of spare contacts. The selector switch shall be General Electric Type SB-1, Westinghouse Type W-2, or equal.
5. Nameplates and mimic bus shall be provided as specified in the Section 16150.

2.9 SPARE PARTS

A. The following spare parts shall be furnished with the DC switchgear. Each set shall include one item for each type.
1. Four DC 2000amp frame feeder circuit breakers.
2. Two DC 4000amp frame circuit breaker.
3. Four of each type of DC protection and auxiliary relays.
4. Four of each type of DC switchgear control and auxiliary switches.
5. Four of each type of DC indicating meters.
6. 12 of each type of indicating LED's.
7. 24 of each type of fuses for AC and DC control circuits.
8. Four of each type of DC transducer.
9. One of each DC shunt of each rating.
10. One negative disconnect switch.

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16360

AC DISCONNECT SWITCH ASSEMBLIES

PART 1 - GENERAL

1.01 SCOPE

A. This Specification Section covers the furnishing of AC disconnect switch assemblies required for new substation. The equipment shall be delivered as completely engineered, fabricated, assembled, inspected, and tested units.

1.3 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI)

C37.32	Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide for High-Voltage Air Switches, Bus Supports, and Switch Accessories
C37.33	Rated Control Voltages and Their Ranges for High-Voltage Air Switches
C37.34	Test Code for High Voltage Air Switches; Correction Included
C39.1	Requirements for Electrical Analog Indications Instruments
C57.13	Requirements for Instrument Transformers

PART 2 - PRODUCTS

2.01 LOAD-BREAK DISCONNECT SWITCH ASSEMBLIES

A. General:

1. The AC disconnect switch assemblies shall include a disconnect switch, motor-operator, instrument transformers, three-phase bus and bus connections, surge arresters, meters and relays, cable terminations, enclosure, power fuses as required, an all devices required to make the disconnect switches operable, as shown on the Drawings. Switch assemblies shall be designed to provide for controlled access, tamper resistance, protection from ingress of rodents and insects, and the possibility of arcing faults within the enclosure. The integrated switch assembly, disconnect switch, and enclosure shall safely withstand the effects of closing and carrying all possible currents up to the assigned maximum short –circuits rating.

B. Disconnect Switch Units:

1. Disconnect Switches: The load-break disconnect switches shall be designed for service on a 3-phase effectively grounded neutral, 60-Hz system at a normal operating voltage of 26.4 kV line-to-line. The disconnect switches shall be provided with motor operators for automatic transfer and remote control.
   a. The switches shall be three-pole, gang-operated, two-position, non-drawout, mounted in metal enclosures.
   b. The switches shall be equipped with stored energy mechanisms for quick-make, quick-break, snap action to open and close the switches independently of the speed with

which the operating handles are moved. Externally visible mechanical “open” and “close” switch position indications shall be provided.

c. The main blade contacts shall be silver plated copper, designed to maintain high-pressure contact when engaged with jaws and hinges.

d. The switches shall be provided with suitable arc chutes to achieve maximum arc extinction for safe closing and interruption.

e. The disconnect switches shall have an on time or two-time duty cycle fault-closing rating equal to, or exceeding, the short-circuit rating of the disconnect switch unit. This rating defines the ability to close the switch once or twice, as applicable, against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current.

f. The disconnect switches shall have the capability to perform switching duties, which include closing and interrupting load current and the rectifier and interrupting load current and the rectifier transformer magnetizing current. All arcing accompanying interruptions shall be contained and within the interrupting units, and arc products and gases evolved during interruption shall be vented through exhaust chambers to discharge ionized gases.

2. Ratings: The minimum ratings of the load-break disconnect switches and the integrated assemblies shall be as follows:

a. Service voltage (kV)	26.4
b. Maximum voltage (kV)	27.3
c. Frequency (Hz)	60
d. Continuous current (Amperes)	600
e. Insulation level, 60 Hz withstand (kV)	60
f. Insulation level, impulse withstand (kV)	125
g. Load interrupting (Amperes)	600
h. Short-Time (3-sec.) current rating (kA, rms. symmetrical)	38
i. Momentary current rating (kA, rms. Asymmetrical)	61

C. Fuses: Power fuses, as required, shall be provided as shown on the Drawings. All fuses shall have time-current characteristics in accordance with ANSI C37.46. The fuses shall be capable of protecting the transformers and their associated feeder cables. The interrupting rating of the fuses shall be coordinated with the transformer rectifier protective relays.

D. Motor-Operators:

1. Motor and gear units shall be directly coupled to the stored energy mechanism shafts for switch operation.
2. The motor-operators shall be in enclosures externally mounted on the sides of the disconnect switch enclosures. Removable handles shall be provided for emergency manual operations. When utilized, the operating handle shall initiate tripping of the transformer-rectifier AC circuit breakers.
3. Means shall be provided for decoupling the motor-operators from the stored energy mechanisms to allow testing of the operators without interrupting service to the load.

E. Enclosures: Each disconnect switch unit shall be housed in a rigid, self-supporting, self-contained, freestanding independent enclosure.

1. Enclosures shall be designed to provide adequate space, volume and strength for venting, and shall withstand all pressure build-up during interruption without permanent distortion or damage to any portion of the structure.
2. Each switch bay shall be a four sided, independently freestanding enclosure, with a structural channel base around the four sides.
3. Inspection windows shall be provided in front of all interrupter switches. The switch contacts shall be visible through the windows.
4. Maintenance and personnel access to the equipment and terminators shall be through the front access doors.
5. The terminal pads shall have 2 NEMA type holes with 9/16 inch drilled holes on 1-3/4 inch centers, located at least 32 inches above the lowest point of the enclosure, for terminating the cable connectors. There shall be adequate clearance around these pads for Raychem Type HVT terminators.
6. Each switch enclosure shall have interlocks between the stored energy operator and its associated switch compartment door, to prevent the operation of the switch when its associated compartment door is open, and to prevent opening the door when the switch is closed.
7. Each compartment shall have an inner hinged protective screen door that bolts closed to prevent inadvertent contact with live parts. The screen door shall not interfere with the visibility of the open contacts of the switches.
8. Each compartment shall have a grounding stud for attaching working grounds that use hot line clamps, such as A.B. Chance #1530GP (wire sizes No. 4/0 to No.6 AWG), located so that the clamps may be readily applied or removed with a “Hot Stick.” The ground studs shall be capable of carrying the fault current of the switchgear.
9. Refer to Section 16150 for general enclosure requirements.

2.02 POWER CABLE CONNECTION

A. Each disconnect switch unit shall be designed for high-voltage cable connection entering from below.

B. Seattle City Light (SCL) will supply and install all terminal lugs, stress cones and all other hardware and devices necessary to terminate the two incoming 26.4-kV lines at Central Substation.

C. Except for the termination kits provided by SCL in Paragraph 2.2.B above. The Contractor shall provide termination kits for each disconnect switch terminal. Each termination kit shall include a compression type cable lug, cable supports, terminating, insulating, and stress-cone material, suitable for single 500-kcmil, 27-kV, stranded, ethylene propylene rubber (EPR) or cross-linked polyethylene (XLPE) insulated copper cables. The terminal chamber of each disconnect switch unit shall be sized to provide ample space for the stress cones and cable bends.

2.03 POTENTIAL TRANSFORMES

A. Potential transformers shall be molded rubber or epoxy construction and shall conform to ANSI C57.13. Transformers shall be insulated for 38 kV Class, with impulse withstand of 125 kV. Both the primary fuses and the potential transformers may be fixed mounted. Primary and secondary circuits of all potential transformers shall be fused by means of non-renewable cartridge type fused. Secondary circuit fuses shall be installed in the low-voltage circuits and shall be located to permit replacement when the switchgear is in operation. All potential transformers shall be adequately rated to handle the burden requirements at the accuracy classification specified, and shall be capable of carrying rated load continuously without excessive heating.

2.04 PROTECTIVE RELAYS, METERS AND CONTOLS

A. General: Required meter, instrument and relay circuits shall be furnished, wired and connected as specified in Section 16345 and as shown on the Drawings. Additional components such as auxiliary

relays, isolating diodes and similar devices not shown, but required for a complete installation, shall be provided.

B. Control Circuits:

1. The Contractor shall provide a complete and operable system. Required additional components, such as devices shall be provided.
2. Control switches shall be provided mounted in the front panel of the disconnect switch units to provide local control for the disconnect switches. All control switches shall be rotary type, suitable for switchboard mounting with a rectangular, front panel engraved escutcheon plate showing switch positions. Each switch contact shall be self-cleaning, readily renewable type, and shall have adequate insulation and contact surface. All control switches shall be spring return to normal with pull and lockout position, shall have pistol grip handles or approved equal, and shall be provided with mechanical indicating devices to show the last operation of the switch. All instrument selector switches shall have round knurled handles. Switches shall be installed so mating contact surfaces are vertical.
3. The disconnect switch positions "open" or "closed" shall be indicated by green and red indicating lamps mounted in the front panel of the disconnect switch units.
4. A selector switch for remote/local operation shall be provided with each disconnect switch. Each switch shall have two sets of spare contacts. The selector switch shall be General Electric Type SB-1, Westinghouse Type W-2, or equal.
5. No fewer than four spare, electrically separate sets of reversible auxiliary switch contacts shall be provided, in addition to those required for the disconnect switch control and annunciator circuits, for use as "a" or "b" contacts. All auxiliary switch contracts, both used and spare, shall be wired to terminal blocks.
6. Test switches shall be provided for all voltmeters, and between the potential transformers and the protective relays supplied by these transformers. Each test switch group shall be mounted in a semiflush case of uniform size, capable of holding at least four voltage positions. A convenient, dull black dust cover shall permit covering the test switches and contacts when they are not in use.
7. Kirk key interlocks shall be provided between the two 26.4 kV line disconnect switches and the 26.4kv tie switch, as shown on the Drawings and specified herein. The intent of the interlocking is to prevent paralleling of the two 26.4 kV lines supplying power to the 26.4 kV bus. Interlocking shall also be provided to ensure that a proper sequence of disconnect switch operation is followed when power feed to the traction substation is transferred from one 26.4 kV line to another. Transfer shall be by manual local control switch or remote supervisory control.
   a. Under normal conditions, power is supplied from one of the 26.4kV lines with the corresponding disconnect switch closed and the 26.4kV tie switch closed. The disconnect switch on the other 26.4kV is open.
   b. Upon loss of AC power to the 26.4 kV line supplying power to the traction substation, operation of the 26.4 kV bus undervoltage relay shall trip and prevent closing of the transformer rectifier AC circuit breakers.
   c. Opening of the 26.4 kV line disconnect switch shall allow closing of the previously opened 26.4 kV line disconnect switch, provided that the voltage on this line is above the minimum value specified in Section 16150, Paragraph 2.1.B.10.
   d. With voltage available on the 26.4 kV bus, the bus undervoltage relay shall reset, and the transformer rectifier AC circuit breakers may be closed.
   e. Manual transfer may also be allowed under normal conditions with power available from either of the two 26.4 kV lines. The sequence to transfer power feed shall be as specified above, except that tripping of the transformer rectifier AC circuit breakers in Step b. shall be by manual local control switch or remote supervisory control.

2.05 SPARE PARTS

A. The following spare parts shall be furnished with the 26.4 kV disconnect switch units. Each set shall include one item for each type of device specified. Spares need not be provided for devices identical to the requirement of Section 16345.

1. Two sets of AC protective and auxiliary relays.
2. Two sets of AC switchgear control and auxiliary switches.
3. Two sets of AC indicating meters.
4. Ten sets of indicating LED's.
5. Ten sets of fuses for AC and DC control circuits.
6. Ten sets of power fuses.

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 16362

DC DISCONNECT SWITCH ASSEMBLY

PART 1 - GENERAL

1.1 SCOPE

This Specification Section covers the furnishing and delivery of DC disconnect switch assemblies. The equipment shall be delivered as completely engineered, fabricated, assembled, inspected, and tested units ready for connection of power cables by others.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of this Section to the extent required:

1. American National Standards Institute (ANSI):
   - C37.40 Service Conditions and Definitions for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories
   - C37.45 Specifications for Distribution Enclosed Single Pole Air Switches

PART 2 - PRODUCTS

2.1 GENERAL

The disconnect switch assemblies shall form a lineup of dead front, fiberglass enclosed, floor or wall-mounted enclosures, as shown on the Drawings, suitable for indoor service. The enclosures shall include single pole, single throw DC disconnect switches, in the quantity as shown on the Drawings. The configuration of the enclosure forming an assembly shall be as shown on the Drawings.

2.2 DISCONNECT SWITCHES

A. Switches: 800 volt DC, no load break, single pole, single throw, rated as shown on the Drawings, capable of carrying rated current continuously without exceeding 50 degrees C rise over 40 degrees C ambient, as manufactured by Pringle Manufacturing Company, or equal. The switches shall be designed to withstand 180,000 DC amperes peak for five cycles at 60 Hz.

B. Contact Surfaces and Blade Assemblies:

1. Blade and contact surfaces shall be silver plated copper. All remaining main current carrying parts shall be copper or copper alloy.
2. Contacts shall be bolted pressure type having initial wiping pressure and bolted pressure at both the hinge and jaw contacts. Contacts shall be capable of withstanding the specified continuous and momentary currents without damage. The clamping mechanisms shall be non-ferrous material.

C. Operating Mechanisms:

1. The disconnects shall be manually operated, direct driven, with an operating handle mounted on the front of the enclosure. The handles shall have provisions for key interlocking in either the open or closed position as shown on the Drawings.
2. Externally visible mechanical "open" and "close" switch position indicators shall be provided.

D. No-Load Interlocks:

1. Each disconnect switch shall be electro-mechanically interlocked with the corresponding DC feeder circuit breaker. Design of the interlock control circuits shall be fail safe: i.e., shall prevent disconnect switch operation with control voltage failure.
2. The electro-mechanical interlock shall comprise of a solenoid-operated steel bolt, designed for 125V DC control power supply.

E. Enclosures:

1. The disconnect switches shall be housed in rigid, self supporting, self contained, fiberglass enclosures, in assembly with other disconnect switch enclosures as shown on the Drawings. Fiberglass shall have a minimum glass to resin ratio of 30 to 70.
2. The enclosures shall be sufficiently rigid to support the disconnect switches and associated devices under normal loads and switching conditions. Minimum fiberglass thickness for sides and doors shall be 1/8 inch and for bottom, top and back shall be 1/4 inch.
3. Each enclosure shall be provided with a separate, bolted, hinged front door for servicing without exposing circuits in adjacent compartments. All maintenance and personnel access to the equipment shall be through the front access doors.
4. Inspection and viewing windows shall be provided in front of all disconnect switch enclosures. The switch contacts and mechanical switch position indication shall be visible through the windows.

F. Auxiliary Contacts: Each disconnect switch shall be provided with auxiliary contacts, two form C or two A and two B, with not less than four spares, rated at 125 V DC, 10 Amps, and operated by the disconnect switch mechanism, for local and remote indication.

G. Enclosure Insulation: All metal parts exposed to the outside of the disconnect switch enclosures shall be insulated from ground, and bonded together and connected to a terminal block for connection to the ground relaying network as specified in Section 16347, Paragraph 2.8.B.5.

H. Cable Connections:

1. The disconnect switches shall be provided with terminal pads, with 4 NEMA type holes, on both the line and load sides to accommodate the specified number of cables as shown on the Drawings.
2. Line side cables (to the DC switchgear) shall pass through the top of the enclosure and load side cables (to the overhead trolley wire system) shall pass through the bottom of the enclosure.
3. NEMA standard terminal lugs shall be furnished for all feeder cables.

I. Surge Arresters: Metal oxide surge arresters shall be installed inside the disconnect switch enclosures, as shown on the Drawings. The DC surge arresters shall be capable of resealing after discharging a surge so as to prevent the flow of 700 V DC follow through current. A fuse in series with the surge arresters shall be provided to prevent the occurrence of a fault in the event the surge arrester fails to reseal. Operation of the fuse shall provide visual indication. Fuses shall be provided with contacts which shall operate upon fuse blown condition and initiate SCADA and local annunciator alarm.

J. Warning Signs: Each disconnect switch enclosure shall be provided with warning signs, mounted on the front door, to read "WARNING - DO NOT OPERATE UNDER LOAD" and "WARNING HIGH VOLTAGE MAY REMAIN ON DISCONNECT SWITCH EVEN WHEN SWITCH IS OPEN". The warning signs shall be fabricated in accordance with the requirements for nameplates identifying major substation equipment as specified in Section 16150.

2.3 SPARE PARTS

A. The following spare parts shall be furnished. Each set shall include one item for each type of device specified.

1. Two DC disconnect switches
2. Six DC surge arresters.
3. Two sets of eletro-mechanical interlock.

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16385

SUBSTATION ENCLOSURE AND ANCILLARY EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

This Section covers the requirements for the supply and delivery of substation enclosures and ancillary equipment.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - C2 National Electrical Safety Code
   - C34.2 Practices and Requirements for Semiconductor Power Rectifiers
   - C37.09 Test Procedure for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
   - C37.14 Low Voltage DC Power Circuit Breakers Used in Enclosures
   - C37.20.1 Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
   - C37.20.2 Metal-Clad and Station Type Cubicle Switchgear
   - C37.90 Relays and Relay Systems Associated with Electric Power Apparatus
   - C57.12.91 Test Code for Dry Type Distribution and Power Transformers
   - C57.18 Pool Cathode Mercury Arc Rectifier Transformers
2. City of Seattle Municipal Code:
   - 25.08.410 Noise Control
3. Electric Utility Service Equipment Requirements Committee (EUSERC) Standards
   - 322 Switchboards, 0-600 Volts, Instrument Transformer Compartment, 1001-3000 Amperes, Three-Phase, Three-Wire or Four-Wire Service
   - 408 High Voltage Metering Enclosure, 20800 to 25000 Volt Service
4. Institute of Electrical and Electronic Engineers (IEEE):
   - 450 Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations
   - 485 Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations
5. National Electrical Manufacturers' Association (NEMA):
   - AB 1 Molded Case Circuit Breakers
   - ICS 6 Enclosures for Industrial Controls and Systems
   - PE 5 Constant Potential Type Electric Utility (Semiconductor Static Converter) Battery Chargers
   - PR 4 Plugs, Receptacles, and Cable Connectors of the Pin and Sleeve Type for Industrial Use
   - RI 9 Silicon Rectifier Units for Transportation Power Supplies
   - SG 5 Switchgear Power Assemblies
   - WC 3 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
6. Occupational Safety and Health Administration (OSHA).

PART 2 - PRODUCTS

2.1 SUBSTATION ENCLOSURE

A. Description: The substation enclosure shall be a totally integrated, weatherproof, insulated, walk-in unit, housing all substation equipment specified herein. The weatherproof enclosure shall meet or exceed the requirements of NEMA SG 5 and Type 3R enclosures in accordance with NEMA ICS-6.

B. Thermal/Noise Insulation: The roof, exterior walls, and exterior doors shall be insulated, double-panel (sandwich type) or alternate construction approved by King County, resulting in an overall "U" factor of 0.27, and external audible noise reduction to 55 dB (A) maximum at any point eight feet away from the enclosure with the transformer-rectifier simultaneously energized at rated input voltage and at 150 per cent full load current. The sound levels shall conform to the requirements of City of Seattle Municipal Code 25.08.410.

C. Audible Noise: The audible noise inside the substation enclosure shall not exceed 60 dB (A) at 3 feet away from any equipment, with the rectifier transformer energized simultaneously at rated input voltage and 150 per cent full load current. Transformer noise transferred to the outside of the substation shall be minimized, in addition to winding and core design, by resilient mounting of the core and coil, the transformer enclosure, and the substation enclosure.

D. Base: The base shall be welded structural steel channel, rigidly braced with steel cross members to provide adequate strength for lifting the complete assembly including all equipment. The inside floor shall consist of steel plate welded to the base, with insulated sheets made of Glastic or equal, and cutouts for cable entry as required. The floor shall be strong enough to withstand the weight of the heaviest circuit breaker or other equipment item, which may have to be moved along the floor. The base shall be of suitable design to permit natural ventilation between substation enclosure and concrete foundation pad to prevent condensation and build up of water.

E. Roof and Walls: The outer roof and outer wall sheets shall be 14 gauge, special panel grade cold rolled sheet steel. Corrugated metal siding for external texturing is not acceptable. The inner roof and inner wall sheets shall be 18 gauge. All exterior panels and doors shall be insulated, double sheet (sandwich) construction. The roof shall be sloped (gable type), with rain caps over adjacent roof panels to eliminate water buildup. Rain gutters and down spouts shall be provided.

F. Personnel Entry Doors: The two entry doors shall be equipped with panic hardware (crash bar), stainless steel hinges with stainless steel hinge pins, and a door holder to maintain the door in the open position. The hardware shall consist of a key lock cylinder on the outside, and a defeating panic bar on the inside to allow fast exit even though the doors are locked. Lock cylinders shall be Best No. X-10. Two keys shall be provided. Entry doors shall be provided with auxiliary contacts to monitor door opening by supervisory (SCADA) alarm. A door switch shall be provided inside the substation to disable the unauthorized entry alarm.

G. Equipment Access Doors: Weatherproof removable panels shall be provided for access to the rear of equipment, where required. Doors to allow removal of the complete rectifier transformer and any switchgear lineup, without disassembly, from the substation enclosure shall be provided as shown on the Drawings. The doors shall be provided with key lock cylinders Best No. X-10. A minimum of three concealed stainless steel hinges with stainless steel hinge pins shall be provided. A door holder shall also be provided.

H. Feeder Cable Access: Access to AC incoming shall be by means of hinged (110-degree swing), bolted and locked interior panels (doors).

I. Lifting Lugs: Removable lifting lugs shall be provided on the enclosure base.

J. Ventilation: All components containing or generating toxic, flammable or harmful gases shall be vented to the outside. Louvers shall be provided at the top and bottom of doors on bays containing heat generating equipment. Hooded louvers with dust filters, Farr type or equal shall be provided as required to protect against splash, driving rain and infiltration of dust. Filters shall be removable and cleanable. Thermostatically controlled exhaust fans shall be provided for personal comfort only**,** and not for supplementary cooling of substation equipment. Ventilation fans shall have their thermostat setting adjustable from 55 degrees F to 90 degrees F. Fans shall have a manual thermostat bypass switch located by the entrance door. All vents shall be insect and vermin proof.

K. Lighting:

1. Fluorescent lighting shall be provided in the DC traction substation to provide a minimum of 50-foot candles at 30 inches above the aisle floor. The interior lighting shall be controlled by flush mounted 3-way switches near each entry door.
2. Emergency lighting shall also be provided. The average emergency lighting intensity shall be at least 1 FC on the aisle floor and 3 FC on each exit door surface. Each unit type emergency lighting unit shall have, as a minimum, a low maintenance battery, automatic solid state battery charger, automatic transfer circuit, test switch, and condition pilot light.
3. An exterior flush weatherproof outlet box with gasketed blank cover and gasket, and conduit with wiring to the AC panel, shall be provided over each man door for exterior lighting.
4. The interior of equipment enclosures, where applicable, shall be lighted with 120 V AC incandescent lamps, locally, externally switched. Power to the lighting in DC equipment enclosures shall, in addition, be as specified in Section 16150, Paragraph 2.1.E.

L. Power Receptacles: A duplex, heavy duty 20 ampere, 120 V AC, 3 wire, grounding type receptacle, conforming to NEMA PR 4, shall be provided near each entry door.

M. Test Panels: Test panels, suitably located and wired, shall be provided for testing of AC and DC circuit breakers outside their enclosures. Suitable leads and connectors shall also be provided.

N. Emergency Trip Switch: One emergency trip switch shall be provided near each exit door. The switch button shall be clearly labeled and protected (guarded) from accidental operation. Intentional operation of either emergency trip switch shall trip all AC and DC breakers through the station lockout relays.

O. Telephone: The Contractor shall furnish and install one telephone cabinet with conduits and wiring. The Telephone Company will install the telephone and bring telephone and SCADA wires to this cabinet.

P. Door Seals: All door seal gaskets shall be made of neoprene. Seals shall be secured to the doors so as to allow easy replacement.

Q. Ground Pads: Standard NEMA two-hole copper ground pads shall be provided at opposite corners of the substation for connection by others to the substation yard ground mat.

R. Fire Protection:

1. A dry chemical type portable fire extinguisher, UL rating 3-A:20-B: C, shall be provided and suitably mounted near each entry door as shown on the Drawings.

2. An ionization type smoke detector system shall be provided with a local alarm and two voltage free contacts, one normally open and one normally closed, wired to the SCADA interface terminal cabinet, for remote alarm.

S. Unauthorized Entry: An unauthorized entry alarm system shall be provided to monitor opening of either one of the two entry doors, with two voltage free contacts, one normally open and one normally closed, wired to the SCADA interface terminal cabinet for remote alarm. The alarm system shall include adjustable time delays to allow disabling and arming the alarm system, after opening and prior to closing the entry doors respectively.

T. Enclosure Finishes:

1. Outdoor Finish:

a. All exterior surfaces of the weatherproof enclosure shall be given a phosphatizing bath. An iron oxide, zinc chromate anticorrosion primer shall be applied to all structural parts that may become inaccessible. A conductive zinc coat shall be applied to all interior and exterior surfaces. Primer shall be Tnemec 50-330 Poly-Ura-Prime, or equal, dry film thickness 2 mils. Intermediate coat shall be Tnemec series 66 Hi-Build Epoxoline, or equal. Topcoat shall be Tnemec series 70/71 Endurashield, or equal. Dry film thickness of the intermediate and topcoats shall be 2 to 3 mils each coat. The color of the finish shall be Sky Gray ANSI 70.

b. Undersurfaces of the outdoor enclosure base shall be coated with a thick, airtight coat of heavy sealing material to provide lasting protection of the undersurfaces from deterioration.

2. Indoor Finish: All indoor surfaces shall be finished as specified in Section 16150, Paragraph 2.2.F.

2.2 UTILITY METERING ENCLOSURE

A. Utility metering enclosures, complete with billing meters, metering CT's and PT's, will be furnished and installed by SCL on a concrete pad outside the substation enclosure. The concrete pad and conduits will be furnished and installed by others. 26 kV power cables will be furnished and installed by SCL.

2.3 AC AND DC DISTRIBUTION PANELS

A. AC Distribution Panels: The AC distribution panel shall include a main molded case circuit breaker, and the necessary molded case branch circuit breakers with a minimum of four 20A spares and four spaces.

B. DC Distribution Panels: The DC distribution panel shall include a main DC circuit breaker and the necessary branch circuit breakers with a minimum of four 20A spares and four spaces. Separate branch circuits shall be provided for each control circuit. Circuit breaker ratings shall be submitted to King County for approval.

2.4 BATTERY SYSTEM

A. Description: The battery system shall include the battery, battery charger, fused disconnect switch, seismic battery rack, accessories and all connections necessary to provide an operating battery system. The nominal battery system voltage shall be 125 V DC ungrounded. The battery system shall conform to the requirements of ANSI C2, Section 14 (Storage Batteries) and OSHA requirements for batteries.

B. Battery: The battery shall be lead-acid type, for switchgear and control application, C & D Batteries type KC, or approved equal, and shall be guaranteed for 5 years from the date of installation against defective parts and workmanship. The battery shall have a minimum expected life of 20 years for the type of service conditions specified.

1. Rating: The battery shall be rated to provide 125 V DC control at full charge to all substation equipment as required. The battery capacity shall be rated in ampere-hours at the 8-hour discharge rate. The final individual cell voltage at the end of the 8 hour discharge period shall be not less than 1.75 V at 77 degrees F. The battery shall be designed to supply the high discharge rates necessary to close and trip both AC and DC switchgear breakers after it has supplied the lower discharge rates demanded by indicating lights and relay coil loads with the AC bus dead for eight hours. The battery capacity shall be based upon IEEE 485 and the following:
   a. Charger failure with substation in full operation.
   b. Startup after AC failure.
   c. Trip and lockout of all circuit breakers in the DC switchgear assembly.
2. Construction: The cell containers shall be heat resistant transparent thermoplastic, which will not deteriorate or become cloudy upon exposure to the electrolyte. Each cell shall be provided with a filler opening fitted with an explosion proof cap. Cell terminal posts shall be clearly and permanently identified. Electrolyte level lines shall be marked on all four sides of each container. Cells shall have a specific gravity between 1.21 and 1.22 at 77 degrees F, when fully charged. Cells shall be provided with intercell connectors. Terminal plates and lugs shall be provided with batteries. Connectors, plates and lugs shall be lead-plated solid copper.
3. Nameplates: The battery shall have a nameplate legibly and permanently marked with the following:
   a. Manufacturer's name
   b. Battery and cell type
   c. One minute, one hour, and eight hour current ratings
   d. Month and year of manufacture
   e. Ampere-hour capacity
4. Accessories: Accessories for normal operation and maintenance of the battery shall be furnished and shall include the following:
   a. One vent mounted thermometer
   b. One cell lifting sling, complete with strap and spreader bar
   c. One battery log book
   d. One quart of terminal grease
   e. One set of special tools for maintenance
   f. One hydrometer with holder
   g. One filling syringe

C. Eye Wash: portable eyewash shall be provided. The eyewash shall be Haws No. 7602.10, or equal.

D. Battery Charger: The battery charger shall be a fully regulated, silicon controlled rectifier, convection cooled, constant voltage, two rate type, and suitable for the size and type of battery employed. The charger shall be rated according to its associated battery capacity at 125V dc, and shall be capable of supplying all permanently connected loads and simultaneously recharging a fully Discharged battery within 8 hours. The charger shall be suitable for operation from a

120/240 V AC, 60 Hz, and single-phase source. The output of the charger shall be constant voltage regulated within one-half (0.5) percent over its complete load range, with + or - 10 percent variation in AC input voltage. The charger shall be current limiting, adjustable within 90 to 120 percent. The charger shall contain a battery eliminator filter to allow the 125VDC control power system to be operable with the batteries removed from service. The noise level from the battery charger with maximum charging load shall not exceed 55 dBA. The battery charger shall have a local indicator panel, equipped with at least the following:

1. AC power 'ON' pilot light.
2. 0-72 hour equalize time.
3. Float and high rate charge voltage adjusting potentiometers.
4. AC failure alarm relay for local and supervisory annunciation.
5. Surge and transient protection.
6. Ground detector relay for local and supervisory annunciation. The ground detector circuit shall withstand accidental application of 700 V DC on 125 V DC control wiring.
7. DC high-low voltage alarm relay for local and supervisory annunciation.
8. One 2 pole AC input molded case circuit breaker, NEMA AB 1.
9. One 2 pole DC output molded case circuit breaker, NEMA AB 1.
10. DC ammeter and voltmeter.
11. Manual equalizing-charge control, with an adjustable timer.
12. In addition to the above accessories, the battery charger shall be provided with a protective device to detect shorting of either 700 V DC positive or negative wiring with either the 125 V DC positive or negative control wiring as follows:
    a. The detection circuit shall be provided with a high impedance connection between the 700 V DC and 125 V DC systems that will limit the leakage current between the two DC systems to 2 milli amps under normal conditions.
    b. The detection circuit shall be immune from any possible leakage current between the 700 V DC system and ground. Note that the 700 V DC negative may be solidly connected to ground.
    c. The protective device shall be Model No. EN0014, as designed and manufactured by Hi-Tran Corporation, or King County approved equal.

E. Racks: The battery shall be mounted on racks designed for the seismic zone specified in Section 16150, Paragraph 2.1.A. The racks shall be two steps, single row type, constructed of steel channels. The racks shall be finish painted with at least two coats of alkaline resistant gray paint. The steel channels shall be equipped with plastic insulation channels, arranged to fit snugly over the steel channels to insulate the cells from the steel racks. The plastic material shall have adequate dielectric strength, and shall resist deterioration from battery electrolyte.

F. Insulating Mat: Electrolyte resistant plastic mat shall be provided under the battery rack, extending not less than 12 inches outside the perimeter of the rack.

G. Battery Safety Kit: A wall mounted battery safety kit shall be furnished containing, as a minimum, the following items:

1. Full coverage eye goggles with air vents and capable of being worn over eyeglasses.
2. One pair of rubber gloves.
3. One rubber apron with straps.
4. One container of acid neutralizing agent.
5. Suitable wall mounted holder for above items.
6. No smoking sign.

The safety kit shall be mounted immediately adjacent to the batteries.

2.5 GROUNDING BUGGIES

A. The following safety ground buggies shall be provided.
   1. Two Ground buggies for use in 26kV AC Breaker cubicles.
   2. Three Ground buggies for use in 2,000A DC feeder breaker cubicles.
   3. Two Ground buggies for use in 4,000A DC main breaker cubicles.

2.5 SPARE PARTS

A. The following spare parts shall be furnished.

1.	Protection fuses	12 of each type and size
2.	Battery Cells	2 Each
3.	Battery Charger	1 Each

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16728

ANNUNCIATOR AND SCADA

PART 1 - GENERAL

1.1 SCOPE

A. This Specification Section covers requirements for the furnishing of a local annunciator and Supervisory Control and Data Acquisition (SCADA) system.

PART 2 - PRODUCTS

2.1 LOCAL ANNUNCIATOR SYSTEM

A. General: The DC traction substation shall be provided with Randtronics Model 607 annunicator or approved equal as specified. (Randtronics Transit Supply, 9624 Airport Way, Snohomish, WA 98296 360-568-1473). All functions to be annunciated as shown, or as specified, shall be annunciated locally. The annunciator panel shall be complete with flasher, buzzer and all auxiliary devices necessary for the operation and functions as shown. The buzzer shall have a silencing switch for manually cutting off the audible warning while retaining all other functions.

B. The annunciator system shall meet or exceed the following tests and conditions;

1. Ambient Temperature: -20 degrees C to 55 degrees C
2. Allowable AC component in DC control voltage supply
   An alternating component of 6.25 V rms. in the 125 V dc station control voltage supply shall be permitted.
3. Special Features:
   a. Fully electrically isolated power supply.
   b. 2400VDC mutually isolated dry contact inputs, each with integral contact wetting supply.
   c. Inputs shall sense resistive contacts up to 500 ohms.
   d. Each annunciator input shall be settable to operate form either a normally open or a normally closed field contact.
   e. Each annunciator input shall have a field follower contact. The field follower contact shall be switch programmable to operate in normal or inverted mode.
   f. High voltage detection (700VDC on supply power) shall be sensed and alarmed on front panel. Status relay shall also be include to provided auxiliary contact for SCADA and/or station Lockout.

g. Dielectric tests between each circuit and all other circuits and annunciator frame or ground reference terminal shall be considered as routine test, and shall be made at the point of manufacture in accordance with this specification and standard C37.90-1989.

h. Dielectric test, in accordance with this specification and standard C37.90-1989 may be made by the user on new annunciators to determine whether specifications are fulfilled.

c. Annunciators shall withstand a direct current dielectric test of the following values:

1. Insulation to ground and between all sensed and supply inputs: 2500 VDC one minute or 3000vdc one second.
2. Across all open contacts: 500 vac.
3. Dielectric Test results report sheet may be required with submittal.

C. Points: A **72**-point annunciator panel shall be supplied. Alarm points shall be used as specified in Section 2.4. The list of annunciator points in Section 2.4 shall be used only to identify the required alarm points. Actual words to be engraved on the annunciator window will be provided later by King County.

D. Indicators:: High intensity red LED indicators systems shall be used. LED's may be used in window type systems provided they are of sufficient intensity that the window can be identified as on/off in direct sunlight. The windows, if used shall be translucent plastic, with black engraving.

E. Logic Modules: Logic modules shall be solid state and interchangeable.

F. Cabinet: The annunciator cabinet shall include busing, wiring and blank windows for spares or future solid state modules. The cabinet finish shall match other interior substation cabinets and enclosures.

G. Power Supply: The annunciator power supply shall be integrally mounted, sized to handle all active and spare solid state logic modules. The power supply shall operate from the substation 125 V DC supply.

H. Spare Modules: Unused points shall contain spare annunciator modules and shall be functional units, including the solid state logic module, lights, window, and necessary wiring to control panel terminal blocks.

I. Accessories:

1. Push Buttons: Annunciator "acknowledge", "test" and "reset" push buttons shall be provided. Each push button shall include identifying nameplates.
2. Indicating Light: The annunciator panel shall be provided with an annunciator status ((ON/OFF)) indicating pilot light. The indicating light shall verify that the annunciator is powered and operable. Provide annunciator failure closing contact for SCADA.
3. Terminal Blocks: The annunciator panel shall be provided with sufficient terminal blocks to accommodate all annunciator positions, including spares and spaces, and auxiliary contacts. Terminal blocks shall be suitable for use with ring-type wire lug

and provided with insulating barrier strips and a marker strip. Terminal blocks shall be easily accessible with substation energized.

J. Operation: The annunciator shall be designed for operation from either normally closed or normally open field contacts. The annunciator shall be provided with "form C" field follower contacts for use with SCADA system.
Test shall energize all alarm points to the flashing position
• Lock-in momentary alarms until acknowledged
• Flashing stops when acknowledged
• Manual reset of acknowledged alarms shall return conditions to normal
• If an alarm condition still exists on one or more inputs, the points shall return to the alarm (flashing) state
• Flasher cut-out switch
• Audible alarm with cut-out switch

2.2 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

A. Each traction substation shall be furnished with a complete, self contained remote terminal unit (RTU) as follows:

Item No.	Qty	Part Number	Description
	1	1 140 CPU 113 02	Quantum Controller, 256K Memory, 8K User Logic, 10K Registers, 1 Modbus
2	1	140 CPS 414 00	Quantum Power Supply 125 VDC Input, Redundant, 8 Amp
3	4	140 DDI 353 00	Quantum Discrete DC Input, 24 DC, Sink, 32 pt.
4	3	140 DDO 885 00	Quantum Discrete DC Output, 24-125 VDC, Source, 0.75 Amp/pt., 12 pt
5	5	140 AVI 030 00	Quantum Analog Input Bipolar, Multirange 0-20-0 ma, 0-5 V, 16 bit, 8 ch.
6	1	140 XBP 006 00	Quantum Backplane, 16 Slot, 26.4x11.4 inches
7	11	140 XTS 002 00	Quantum 40 Point I/O Terminal Strip Connector
8	1	990 NAA 263 20	Quantum Cable, Modbus, RS-232, 12 ft.
9	1	UDS 202t	Motorola VDC powered modem
10	1		125 VDC to 24 VDC Power Converter

B. The Contractor shall furnish and install the RTU and associated interface terminal cabinet, complete with terminal blocks, mounted as shown on the Drawings. The Contractor shall provide all the necessary auxiliary contacts, interposing relays and transducers, and the wiring between these devices and the interface terminal cabinet, as specified. The Contractor shall also provide the wiring between the interface terminal cabinet and the RTU.

C. The required supervisory control, indication, alarm and analog functions for the DC traction substations are specified in Section 2.4.

D. The interface terminal cabinet shall be indoor type, made of 11 gauge special panel grade steel sheet, and provided with a hinged door. The door shall have a minimum of two concealed stainless steel hinges with stainless steel hinge pins. The door handle shall have provision for padlocking. The cabinet finish shall be the same as specified for indoor equipment enclosures.

E. The cabinet shall be adequately sized to allow for the mounting of the RTU and terminal blocks (including 10 percent spares) required for SCADA input/output requirements. Terminal blocks for analog functions shall be short-circuiting type. There shall be sufficient room inside the cabinet to allow accommodation of all wiring to any terminal block. The terminal blocks shall meet the requirements specified in Section 16150. The cabinet shall meet or exceed the requirements of NEMA ICS-6 for Type 2 indoor enclosures.

2.3 ANNUNCIATOR AND SCADA REQUIREMENTS

A. Auxiliary contacts shall be provided to accommodate the local annunciation and remote indication and alarm specified herein. The auxiliary contacts shall be electrically separate, rated 125 V DC, 10 Amps, normally open for local annunciation, and normally open for remote indication and alarm. Separate auxiliary contacts shall be furnished for local and remote (SCADA) annunciation. Separate auxiliary contacts shall be furnished for remote indication of circuit breaker close and open positions.

B. Each remote control function specified herein shall be provided with an interposing relay, rated 125 V DC, General Electric Type HGA, Westinghouse Type SG, or equal.

C. Each analog function specified herein shall be provided with a transducer. The transducers shall be solid state type with output from zero to one milliampere DC full scale, suitable for termination into a load resistance of up to 10 K ohms. DC voltage and current transducers shall be totally enclosed in a steel case, with an integral bracket, and mounted on insulation boards to provide full insulation from ground of 1,000 V DC. DC current transducers shall be zero-centered. The transducers shall be wired and mounted in the same enclosure as the devices to which the transducers are connected. The external power source, if required, shall be from the 125 V DC (+10 percent) station battery.

1. AC Current Transducers: Operating input range shall be single phase, 0-5 amperes, 60 Hz with overload capability of 20 amperes continuous and 250 amperes for 1.0 second. Burden shall not exceed 2.0 VA at 60 Hz. The AC current transducers shall be Rochester Instrument Systems, Model CCC-LB, or equal.
2. AC Voltage Transducers: The nominal input voltage to each AC voltage transducer shall be single phase, 120 V, 60 Hz. The operating input range shall be 0 to 150 V AC with continuous overload capability to 180 V AC. Burden shall not exceed 2.5 VA at 120 V AC, 60 Hz. The maximum allowable error shall not

exceed plus or minus 0.25 percent of full scale at 25 degrees C. AC output ripple shall not exceed one percent. The error resulting from a temperature variation between minus 20 degrees C and 60 degrees C shall not exceed plus or minus 0.5 percent of full scale. The unit shall be provided with a 10 percent full-scale calibration adjustment. The response time shall be 400 ms or better from 0 to 99 percent. The unit shall withstand a dielectric test of 1500 V RMS. The AC voltage transducers shall be Rochester Instrument Systems, Model VCC-1B, or equal.

3. Temperature Transducer: The temperature input range shall be coordinated with the type of Resistance Temperature Detector (RTD) supplied with the rectifier transformer. The output range shall be suitable for the temperature class of the rectifier transformers. The temperature transducer shall be Rochester Instrument Systems, Model SC 1372, or equal.
4. DC Voltage Transducers: The nominal input voltage to each DC voltage transducer shall be 700 V DC. The operating input range shall be 0-800 V DC with one minute overload capability to 4,000 V DC. The maximum allowable error shall not exceed plus or minus 0.5 percent of full scale at 25 degrees C. Temperature coefficient shall not exceed plus or minus 0.04 percent per degree C. Load resistance variations from 0 to 10 K ohms shall affect the output current no more than 0.1 percent. The input circuit shall be completely isolated from all other circuits and grounds. The output circuit shall include internal filtering. Zero and gain adjustments shall be accessible from outside the case. The DC voltage transducers shall be ETL Corporation's model 339; or equal.
5. DC Current Transducers: Each DC current transducer shall be similar to each DC voltage transducer, except it shall be designed to measure a plus or minus 50 millivolt signal across a 50 MV shunt that operates at nominally 700 V DC. The operating input range shall be zero to plus or minus 50 MV. The transducer shall meet all other requirements defined for the DC voltage transducers in Subparagraph 5 above. The DC current transducers shall be ETL Corporation's model 339; or approved equal.
6. Compatibility: The Contractor shall verify the compatibility of his equipment with the DC voltage and current transducer models listed as acceptable, or with other devices proposed as equal. For information on the models listed, the Contractor shall contact the following manufacturer:
   ETL Corporation, Model 339
   Phone (360) 568-1473
   9624 Airport Road
   Snohomish, Washington 98290
7. All transducer outputs shall be wired to SCADA input terminals with shielded twisted pair wire of not smaller than #20 AWG. Shields shall be single point terminated at SCADA rack or interface terminal cabinet.

2.4 LIST OF ANNUNCIATOR AND SCADA POINTS

A. Auxiliary contacts, interposing relays and transducers shall be provided to accommodate

the following annunciator and SCADA functions.

SCADA Functions

Equipment	SCADA Control	SCADA Indication	SCADA Alarm	Local Annunciator
AC Switchgear:				
AC Breaker A Close	X	X		
AC Breaker A Trip	X	X	X	X
AC Breaker A Local/Remote Mode		X		
AC Breaker A Gas Low Pressure			X	X
Lockout Relay (86R) Bus A		X	X	X
26.4 kV AC Undervoltage (27) - Bus A			X	X
AC Breaker B Close	X	X		
AC Breaker B Trip	X	X	X	X
AC Breaker B Local/Remote Mode		X		
AC Breaker B Gas Low Pressure			X	X
Lockout Relay (86R) Bus B		X	X	X
26.4 kV AC Undervoltage (27) - Bus B			X	X
AC Disconnect Switch A Open/Close		X		
AC Disconnect Switch B Open/Close		X		
AC Disconnect Tie Switch Open/close		X		
Rectifier Transformer A:				
Transformer Overtemperature (49WT1), Alarm			X	X
Transformer Overtemperature (49WT2), Trip			X	X
Rectifier Diode Overtemperature (49DA), Alarm			X	X
Rectifier Diode Overtemperature (49DT), Trip			X	X
Rectifier Diode Failure (58A), Alarm			X	X
Rectifier Diode Failure (58T), Trip			X	X
Rectifier Transformer B:				
Transformer Overtemperature (49WT1), Alarm			X	X
Transformer Overtemperature (49WT2), Trip			X	X
Rectifier Diode Overtemperature (49DA), Alarm			X	X
Rectifier Diode Overtemperature (49DT), Trip			X	X
Rectifier Diode Failure (58A), Alarm			X	X
Rectifier Diode Failure (58T), Trip			X	X

Equipment	SCADA Control	SCADA Indication	SCADA Alarm	Local Annunciator
DC Switchgear A:				
Rect DC Main Breaker, Close	X	X		
Rect DC Main Breaker, Open	X	X	X	X
Rect DC Negative Disconnect, Close		X		
Rect DC Negative Disconnect, Open		X		
Feeder Breaker A1, Close	X	X		
Feeder Breaker A1, Trip	X	X	X	X
Feeder Breaker A2, Close	X	X		
Feeder Breaker A2, Trip	X	X	X	X
Feeder Breaker A3, Close	X	X		
Feeder Breaker A3, Trip	X	X	X	X
Feeder Breaker A4, Close	X	X		
Feeder Breaker A4, Trip	X	X	X	X
Feeder Breaker A5, Close	X	X		
Feeder Breaker A5, Trip	X	X	X	X
Feeder Breaker A6, Close	X	X		
Feeder Breaker A6, Trip	X	X	X	X
Feeder Lockout Relay (86F) Bus A			X	X
Feeder Surge Arrester Fuse, Summary Alarm			X	X
DC Switchgear B:				
Rectifier DC Main Breaker, Close	X	X		
Rectifier DC Main Breaker, Open	X	X	X	X
Rectifier DC Negative Disconnect, Close		X		
Rectifier DC Negative Disconnect, Open		X		
Feeder Breaker B1, Close	X	X		
Feeder Breaker B1, Trip	X	X	X	X
Feeder Breaker B2, Close	X	X		
Feeder Breaker B2, Trip	X	X	X	X
Feeder Breaker B3, Close	X	X		
Feeder Breaker B3, Trip	X	X	X	X
Feeder Breaker B4, Close	X	X		
Feeder Breaker B4, Trip	X	X	X	X
Feeder Breaker B5, Close	X	X		
Feeder Breaker B5, Trip	X	X	X	X
Feeder Breaker B6, Close	X	X		
Feeder Breaker B6, Trip	X	X	X	X
Feeder Lockout Relay (86F) Bus B			X	X
Feeder Surge Arrester Fuse, Summary Alarm			X	X
Feeder Disconnect A1,Open/Closed		X		
Feeder Disconnect A2,Open/Closed		X		
Feeder Disconnect A3,Open/Closed		X		
Feeder Disconnect A4,Open/Closed		X		
Feeder Disconnect A5,Open/Closed		X		
Feeder Disconnect A6,Open/Closed		X		

Equipment	SCADA Control	SCADA Indication	SCADA Alarm	Local Annunciator
Feeder Disconnect B1,Open/Closed		X		
Feeder Disconnect B2,Open/Closed		X		
Feeder Disconnect B3,Open/Closed		X		
Feeder Disconnect B4,Open/Closed		X		
Feeder Disconnect B5,Open/Closed		X		
Feeder Disconnect B6,Open/Closed		X		
Feeder A1, Recloser (82) Locked Out			X	X
Feeder A1, Local/Remote Mode (43)		X		
Feeder A2, Recloser (82) Locked Out			X	X
Feeder A2, Local/Remote Mode (43)		X		
Feeder A3, Recloser (82) Locked Out			X	X
Feeder A3, Local/Remote Mode (43)		X		
Feeder A4, Recloser (82) Locked Out			X	X
Feeder A4, Local/Remote Mode (43)		X		
Feeder A5, Recloser (82) Locked Out			X	X
Feeder A5, Local/Remote Mode (43)		X		
Feeder A6, Recloser (82) Locked Out			X	X
Feeder A6, Local/Remote Mode (43)		X		
Feeder B1, Recloser (82) Locked Out			X	X
Feeder B1, Local/Remote Mode (43)		X		
Feeder B2, Recloser (82) Locked Out			X	X
Feeder B2, Local/Remote Mode (43)		X		
Feeder B3, Recloser (82) Locked Out			X	X
Feeder B3, Local/Remote Mode (43)		X		
Feeder B4, Recloser (82) Locked Out			X	X
Feeder B4, Local/Remote Mode (43)		X		
Feeder B5, Recloser (82) Locked Out			X	X
Feeder B5, Local/Remote Mode (43)		X		
Feeder B6, Recloser (82) Locked Out			X	X
Feeder B6, Local/Remote Mode (43)		X		
DC Feeder Breaker Recloser Relay Failure - Summary Alarm			X	X

	SCADA Control	SCADA Indication	SCADA Alarm	Local Annunciator
Miscellaneous:				
Loss of Control Voltage AC Swgr. A			X	X
Loss of Control Voltage AC Swgr. B			X	X
Loss of Control Voltage Rectifier A			X	X
Loss of Control Voltage Rectifier B			X	X
Loss of Control Voltage DC Swgr. A			X	X
Loss of Control Voltage DC Swgr. B			X	X
Battery Charger Summary Alarm			X	X
Battery Undervoltage			X	X
DC System Negative Voltage to Ground High			X	X

Annunciator Failure	X	
DC Enclosures Grounded (64R) - A Bus	X	X
DC Enclosures Grounded (64R) - B Bus	X	X
DC Enclosures Alive (64MR) - A Bus	X	X
DC Enclosures Alive (64MR) - B Bus	X	X
125V DC Voltage Shorted with 700V DC (59)	X	X
Unauthorized Entry	X	
Smoke Detector	X	X
Ground Relay (64R/64MR) Failure - Summary Alarm	X	X

Equipment	Remote Analog Points
XFMR A Winding Temperature	X
Negative Current to Ground	X
Feeder A1 DC Volts	X
Feeder A1 DC Amps	X
Feeder A2 DC Volts	X
Feeder A2 DC Amps	X
Feeder A3 DC Volts	X
Feeder A4 DC Volts	X
Feeder A4 DC Amps	X
Feeder A5 DC Volts	X
Feeder A5 DC Amps	X
Feeder A6 DC Volts	X
Feeder A6 DC Amps	X
26-kV Bus A Voltage	X
26-kV Bus A Current	X
Transf/Rect A DC Volts	X
Transf/Rect A DC Current	X
XFMR B Winding Temperature	X
Feeder B1 DC Volts	X
Feeder B1 DC Amps	X
Feeder B2 DC Volts	X
Feeder B2 DC Amps	X
Feeder B3 DC Volts	X
Feeder B4 DC Volts	X
Feeder B4 DC Amps	X
Feeder B5 DC Volts	X
Feeder B5 DC Amps	X
Feeder B6 DC Volts	X
Feeder B6 DC Amps	X
26-kV Bus B Voltage	X
26-kV Bus B Current	X
Transf/Rect B DC Volts	X
Transf/Rect B DC Current	X

2.5 SPARE PARTS

A. Description: The following spare parts shall be furnished, and the cost shall be included in the lump sum price quoted.

1. One complete RTU unit with all modules
2. One of each type of RTU modules
3. One complete annunciator with all PC cards
4. One of each type of annunciator PC cards

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 16950

TESTING

PART 1 - GENERAL

1.1 SCOPE

A. This Section covers the requirements for the factory and field-testing to be performed by the Contractor on traction substation equipment furnished under this Contract.

B. Testing shall not commence until all design affecting the respective equipment has been approved. In addition, test procedures shall have been approved at least 15 days prior to the start of testing.

1.2 APPLICABLE STANDARDS

A. Pertinent provisions of the following listed standards shall apply to work of this Section, except as they may be modified herein, and are hereby made a part of these Specifications to the extent required:

1. American National Standards Institute (ANSI):
   - C34.2 Practices and Requirements for Semiconductor Power Rectifiers
   - C37.09 Test Code for AC High-Voltage Circuit Beakers Rated on a Total Current Basis
   - C37.14 Low Voltage DC Power Circuit Breakers Used in Enclosures
   - C37.20.1 Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
   - C37.20.2 Metal-Clad and Station Type Cubicle Switchgear
   - C37.34 Test Code for High Voltage Air Switches
   - C37.41 Design Test for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories
   - C37.71 Three Phase, Manually Operated, Subsurface, Load Interrupting Switches for Alternating Current Systems
   - C37.90 Relays and Relay Systems Associated with Electric Power Apparatus
   - C39.1 Requirements for Electrical Analog Indicating Instruments
   - C57.12.91 Test Code for Dry Type Distribution and Power Transformers
   - C57.13 Requirements for Instrument Transformers
   - C57.18 Pool Cathode Mercury Arc Rectifier Transformers
2. Institute of Electrical and Electronics Engineers (IEEE):
   - 450 Recommended Practice for Maintenance, Testing and Replacement of Large, Lead, Storage Batteries for Generating Stations and Substations
3. National Electric Manufacturer's Association (NEMA):
   - PE 5 Constant Potential Type Electric Utility (Semiconductor Static Converter) Battery Chargers
   - RI 9 Silicon Rectifier Units for Transportation Power Supplies
   - WC 3 Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

1.3 TEST WITNESSING

King County or its agents reserve the right to witness all tests whether conducted by the Contractor, by an independent agency, or by the Contractor's suppliers. If King County determines not to witness a test or tests, test reports shall nevertheless be submitted to King County for approval. The reports shall be signed

by all responsible witnessing parties.

1.4 RESPONSIBILITY

The Contractor shall be responsible for all factory and field tests performed under this Contract. The Contractor shall furnish all test instruments for both factory and field tests described herein, and other equipment and materials necessary for performing all factory tests required prior to shipment. All test equipment shall be calibrated within 30 calendar days prior to use, unless otherwise approved by King County. Proof of calibration shall be submitted with all test reports. Should there be any loss of equipment or damage to such equipment as a result of tests, the Contractor shall be fully responsible for replacing the damaged equipment or repairing such equipment. Replacement of damaged equipment shall include all costs, including but not limited to, removing damaged equipment, furnishing, transporting, and installing replacement equipment.

1.5 REJECTION AND RETESTING

Equipment, which fails to meet test specifications and the specified ratings, shall be replaced with new equipment that conforms to the Contract requirements. Modifications to rejected equipment may be made only with the approval of King County. Rejected equipment shall be retested after reworking or replacement. The entire cost of the modifications or the new unit shall be borne by the Contractor, including retesting and the cost of witnessing retesting, including that of King County. If modifications or changes affect any drawings, diagrams, or other documents previously submitted to and accepted by King County, revised drawings or diagrams shall be submitted for King County's approval showing proposed changes before changes or modifications are made on the equipment. Modifications or changes, which do not warrant revision of a drawing, shall still be furnished to King County with notice of the retest schedule. If it is not practicable to rework rejected equipment, new equipment shall be manufactured. The requirement for drawings and design calculations of the original unit shall be applicable to the new unit. Failure of equipment to meet the test specifications shall not be the cause for an extension of time of delivery.

1.6 TEST REPORTS

A. The Contractor shall provide and complete test reports prepared in accordance with Paragraph 1.10.E of Section 16010. The forms shall be prepared by the Contractor and approved by King County for each test. Failure to complete test reports properly may delay successive testing and will be considered sufficient cause to delay progress payments.

B. After each test report is signed by King County or its agents, the Contractor shall submit copies of the report to King County for filing and distribution.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 FACTORY TESTS

A. Factory tests shall include design and production tests, especially those recommended by ANSI, NEMA, and all alternative standards to which the equipment may be designed. New design tests may, at King County's option, not be required where tests equal to, or more stringent than, those specified here have been performed and documented by the Contractor on essentially identical equipment to that being used on this Contract. King County will review tests procedures, test results and certified documentation of

previous tests, and where the specified design test requirements are met, the design tests may be waived, except as otherwise specified below, and retesting may not be required.

B. Rectifier Transformer:

1. Design Tests: The following factory tests shall be performed on one 1,500 kW rectifier transformer. This test will not be waived except as specified below.
   a. Commutating reactance tests as described in ANSI C34.2.
   b. Short circuit tests, as described in ANSI C57.12.91, shall be made to evaluate fully the capability of all windings. At least one extreme of the tap range shall be used in the tests. Faults shall be applied on the secondary terminals. Tests shall be performed for each secondary winding. These short circuit tests may be waived by King County if the Contractor submits sufficient data proving to King County's satisfaction that tests identical to the above requirements have been performed on an identical transformer. An identical transformer for the purpose of this Contract is defined as that rated in accordance with Section 16325 of these Specifications and as shown on the Drawings.
   c. Dielectric impulse with positive polarity waves as described in NEMA RI 9. The impulse tests shall include one application of a reduced full wave, and two applications of a chopped wave, followed by one application of a full wave. These tests shall be performed after the short circuit tests.
   d. Resistance measurement of all windings on rated voltage connections and on all taps.
   e. Impedance and load losses at rated current on rated voltage connections and on all taps.

2. Production Tests: The following tests, described in NEMA RI 9, shall be performed on all rectifier transformers:
   a. Resistance measurements of all windings on rated voltage connections and on all taps.
   b. Ratio tests on the rated voltage connections and on all taps.
   c. Polarity and phase relation tests on the rated voltage connections.
   d. Impedance and load losses at rated current on the rated voltage connections and on all taps, including excitation loss and excitation current.
   e. Excitation loss and excitation current rated voltage on the rated voltage connections.
   f. Applied potential and induced potential.
   g. Partial discharge tests as follows:
      1) The transformer shall be subjected to an induced voltage of 1.5 times the rated voltage at a frequency between 100 Hz and 400 Hz.
      2) Partial discharge measurements shall be performed with a selected instrument operating at a frequency of 1.9 MHz.
      3) Partial discharge extinction level shall be reached at an induced voltage higher than 1.2 times rated line to line voltage.
      4) Partial discharge extinction level will be considered to have been reached when the reading at 1.9 MHz is less than 10 microvolts or 13 picocoulombs.

C. Rectifier:

1. Design Tests: The rated current test described in ANSI C34.2 shall be, or shall have been, performed on one 1,500 kW rectifier unit. This test will not be waived.
2. Production Tests: The following tests described in ANSI C34.2 shall be performed on all rectifier units:
   a. Dielectric Strength
   b. Rated voltage

D. Transformer Rectifier Unit: Design tests shall be performed on one 1,500 kW transformer rectifier unit, including accessories and bus connecting the transformer to the rectifier, in accordance with ANSI C34.2. The tests shall verify efficiency, voltage regulation, and displacement power factor at loads of zero, 50, 100, 150, and 200 percent of rated load. Tests specified in this Paragraph will not be waived.

E. AC Switchgear:

1. Design Tests: The following tests described in ANSI C37.20 as "Design Tests" shall be, or shall have been performed on one AC switchgear assembly:
    a. Rated Continuous Current
    b. Momentary Current
    c. Interrupting
    d. Sequence
    e. Flame Retardant Test
2. Production Tests: The following tests, described in ANSI C37.20 as "Production Tests", shall be performed on all AC switchgear assemblies:
    a. Dielectric tests including power frequency and impulse withstand
    b. Mechanical Operation
    c. Grounding of instrument transformer cases
    d. Electrical operation and control wiring tests including control wiring continuity, control wiring insulation, polarity, and sequence.

F. AC Circuit Breakers:

1. Design Tests: The following tests, described in ANSI C37.50 as "Design Tests", shall be, or shall have been, performed on one 26.4 kV circuit breaker in addition to the radio influence voltage tests described in NEMA SG4.
    a. Rated maximum voltage
    b. Rated frequency
    c. Rated continuous current carrying tests
    d. Short circuit rating
    e. Rated standard operating duty
    f. Rated permissible tripping delay
    g. Rated interrupting time
    h. Rated reclosing time
    i. Dielectric withstand tests including rated low frequency withstand voltage and rated full wave impulse withstand voltage
    j. Rated control voltage
    k. Load current switching
    l. Mechanical life
2. Production Tests: The following tests, described in ANXI C37.50 as "Production Tests", shall be performed on all 26.4 kV AC circuit breakers.
    a. Current transformer
    b. Nameplate check
    c. Resistors, heaters, and coil check
    d. Control and secondary wire check
    e. Clearance and mechanical adjustment check
    f. Mechanical operation
    g. Timing
    h. Stored energy system
    i. Electrical resistance of current path
    j. Low frequency withstand voltage

G. AC Disconnect Switch:

1. Design Tests: The following tests described in ANSI C37.34 shall be, or have been, performed on one representative AC disconnect switch of each type.
    a. Dielectric tests, including power frequency withstand, impulse withstand, and open gap withstand tests
    b. Radio influence tests

c. Temperature rise tests
d. Short time current tests
e. Interrupting tests, including load current and magnetizing current tests.

2. Production Tests: The following tests described in ANSI C37.71 as “Production Tests”, shall be performed on all AC disconnect switches in addition to the control and secondary wire check described in ANSI C37.09.
   a. Circuit resistance test
   b. 60-Hz withstand test
   c. Leak test
   d. Operating assurance tests

H DC Switchgear:

1. Design Tests: The following tests, described in ANSI C37.20 as "Design Tests”, shall be, or shall have been, performed on one DC switchgear assembly:
   a. Rated Continuous Current
   b. Momentary current
   c. Interrupting
   d. Mechanical operation
   e. Sequence
   f. Flame retardant test
2. Production Tests: The followings tests, described in ANSI C37.20 as "Production Tests", shall be performed on all DC switchgear assemblies:
   a. Power frequency and impulse withstand
   b. Mechanical operation
   c. Electrical operation and control wiring including control wiring continuity, control wiring insulation, polarity, and sequence

I. DC Circuit Breakers:

1. Design Tests: Design tests shall be, or shall have been, performed on one DC circuit breaker in the order specified in Section 9.2 of ANSI C37.14. For the semi high speed DC feeder circuit breaker, the parameters to be used for the short circuit test shall be as specified in Section 16347, Paragraph 2.4.A.1 and 2.4.A.2.
2. Production Tests: The following tests described in ANSI C37.14 as "Production Tests", shall be performed on all DC circuit breakers:
   a. Control and secondary wiring check
   b. Power frequency dielectric
   c. No load operation
   d. Calibration

J DC Disconnect Switches:

1. Design Tests: The following tests, described in ANSI C37.41 as "Design Tests,” shall be, shall have been, performed on one DC disconnect switch of each type:
   a. Dielectric
   b. Radio influence
   c. Short time current
   d. Temperature rise
2. Production Tests: The following tests described in ANSI C37.41 as "Production Tests shall be performed on all DC disconnect switches:
   a. Dielectric
   b. Mechanical Operation

K Relays:

1. Design Tests: Design tests shall be, or shall have been, performed on one relay of each type and rating in accordance with ANSI C37.90.

2. Production Tests: Production tests shall be performed on all relays in accordance with ANSI C37.90.

L Meters:

1. Design Tests: Design tests shall be, or shall have been, performed on one meter of each type and rating in accordance with ANSI C39.1.
2. Production Tests: Production Tests shall be performed on all meters in accordance with ANSI C39.1.

M. Istrument Transformers:

1. Design Tests: Design tests shall be, or shall have been, performed on one instrument transformer of each type and rating in accordance with ANSI C57.13.
2. Production Tests: Production tests, described in ANSI C57.13 as "Routine Tests", shall be performed on all instrument transformers.

N. Anunciator Panel:

1. Design Tests: Design tests shall be, or shall have been, performed on one annunciator panel with all accessories in place in accordance with ANSI C37.20.
2. Production Tests: By means of insulation resistance, continuity, and operation tests, all annunciator panels, with all accessories in place, shall be production tested for proper operation, accuracy, short circuits, and open circuits, in accordance with ANSI C37.20.

O. Battery

1. Design Tests: Design tests, described in IEEE 450 as "Service Tests", shall be, or shall have been, performed on one battery unit.
2. Production tests, described in IEEE 450 as "Acceptance Tests", shall be performed on all batteries.

P. Battery Charger

1. Design Tests: The following tests, described in NEMA PE 5 as "Design Tests", shall be, or shall have been, performed on one battery charger:
    a. Dielectric
    b. Voltage adjustment
    c. No load
    d. Temperature rise
    e. Current limit
    f. Short circuit
    g. Static voltage deviation
    h. Efficiency measurement
    i. Power factor measurement
    j. Ripple voltage measurement
    k. Audible noise
    l. Stability and response
    m. Transient voltage withstandability
    n. Dielectric
    o. Voltage adjustment
    p. No load
    q. Current limit
    r. Ripple voltage measurement

Q. Station Service Equipment:

1. Design Tests: Design tests, described in ANSI C57.12.91, shall be, or shall have been, performed on one station service transformer.
2. Production Tests: Production tests, described in ANSI C57.12.91 as "Routine Tests", shall be

performed on all station service transformers.

R. Wire and Cable: Production tests shall be performed on all insulated wire and cable in accordance with NEMA WC3.

S. Assembled Substation: The following tests shall be performed on one substation unit with all equipment installed in the substation enclosure prior to shipment, unless otherwise specified:

1. Functional and Operational Tests: The Contractor shall perform functional and operational tests to verify that all equipment functions in accordance with approved control schematics. After successfully testing each function, the function shall be checked off on the applicable control schematic with a yellow marker.
2. Temperature-Rise Tests:
   a. These tests shall be performed on one complete substation to the duty cycle, as specified in Section 16325, Paragraph 2.1.C, to verify the following:
      1) The limit of transformer temperature rise, measured by resistance, shall be as described in Section 16325, Paragraph 2.2.C.
      2) The temperature-rise limit for the rectifier shall be as described in ANSI C34.2 and NEMA RI-9.
      3) The temperature-rise limit for the bus connecting the transformer and rectifier, rectifier and DC switchgear, and rectifier and negative enclosure shall be as described in ANSI C37.20.
   b. Thermocouples: The number and locations of thermocouples for temperature-rise tests, or approved equal devices, shall be as specified below. The thermocouple with the highest temperature reading shall be considered when determining the limit of temperature rise:
      1) Transformer: A minimum of three thermocouples or approved equal devices placed in contact with the windings in such a manner as to indicate the temperature of each transformer coil, unless otherwise approved by the Engineer. The first thermocouple in each coil shall be located 3 to 6 inches from the top of the coil.
      2) Busway: A minimum of four thermocouples shall be used and located as indicated in ANSI C37.20.
      3) Rectifier: A minimum of one thermocouple shall be located on each phase of the rectifier. Thermocouple locations will be selected by King County.
3. Proper operation and setting of all protective devices shall be verified to be in accordance with the approved protective device coordination study.
4. Short Circuit Tests: DC bolted fault tests shall be performed to verify capability of the equipment to withstand maximum fault current without damage. The source shall have rated voltage + - 5 percent, three-phase power, with an interrupting capability as specified in Section 16150, Paragraph 2.1.B.
   a. Bolted faults shall be applied at the following locations:
      1) Load side of one DC feeder breaker. This test shall verify that only this circuit breaker will trip.
      2) DC positive bus. This test shall verify that protective relays on the AC side will initiate tripping of the transformer rectifier lockout relay.
   b. The AC circuit breaker and the DC feeder breaker shall all be monitored simultaneously to show the status of each circuit breaker during and after each short circuit application. In addition, each phase of the AC circuit breaker shall be monitored. Test results, such as total inrush current, steady state fault current, impulse time of faulted unit, clearing time of faulted unit, clearing time of other unit, and primary system capacity, shall be recorded on an oscillograph. All data recorded on oscillograph shall be properly labeled and identified.
   c. All equipment shall be inspected for damage, including loose bolts, after each short circuit test. Failure of the equipment to withstand these tests or to coordinate or meet

specified requirements shall be grounds for rejection of the equipment.

5. Reverse Current Trip: The Contractor shall apply current in the reverse direction to verify that the reverse current relay trips the transformer rectifier lockout relay.
6. Noise Level Tests: The Contractor shall perform noise level tests as follows:
   a. Noise level tests shall be performed with the transformer rectifier with a short circuit on the load side of the rectifier and energized at reduced input voltage to flow 100 percent rated load. The transformer shall be housed in its enclosure with all panels bolted. The audible noise level, measured 6 feet away from the transformer and the rectifier, inside the substation enclosure, shall not exceed 55 dBA at 100 % load.
   b. Under the same test condition as in paragraph a above, the audible noise level shall not exceed 55 dBA at any point 6 feet away from the substation enclosure.
7. SCADA: The Contractor shall perform tests on the RTU to demonstrate that all the discrete and analog inputs function properly and to demonstrate that all the control outputs function properly.

3.2 FIELD TESTS

A. General:
1. The Contractor shall perform the specified field tests after installation of the substations by King County's Installation Contractor. The Contractor shall verify that the substations are properly installed, connected, and in operable condition. No equipment shall be energized or placed in the operating mode until approved by King County.
2. The Installation Contractor will provide support for field tests performed by the Contractor. Support will be tools, labor, lighting, ladders, trucks and similar items, and assistance as required by the Contractor to properly conduct field tests.
3. The Contractor shall provide all electrical instruments, test devices, short circuiting devices, and meters, as specified in Paragraph 1.4 of this Section.
4. The Contractor shall designate a Test Manager who shall be responsible for the overall conduct of the tests. The Test Manager shall notify and obtain approval from the King County designated Field Engineer each time a substation is energized for testing.

B. Mechanical Tests: The Contractor shall perform mechanical checks on the physical integrity of all equipment furnished under this Contract.

C. Short-Circuit Field Tests:
1. The Contractor shall perform fault tests to verify the proper calibration and setting of all protective relays. The relay settings referred to in Section 16010, Paragraph 1.10.B.2.h, shall be the basis for this test. Proper operation shall require the correct protective relay to close its contacts to trip the feeder breaker associated with the fault. Fault tests shall be performed on all substations.
2. One substation shall be energized at a time, and connected to the overhead trolley wire system. Faults shall be applied in the over head trolley wire system at several locations, starting at a point in the immediate vicinity of the traction substation under test, and at every 1,000 foot interval away from the substation, up to a point in the vicinity of the substation beyond the next adjacent traction substation.
3. The high voltage AC circuit breaker and DC circuit breakers of the substation under test shall be monitored simultaneously to show the status of each DC circuit breaker during and after each short-circuit application. Test results, such as total inrush current, steady state fault current, impulse time of faulted unit, clearing time of faulted unit, and clearing time of other unit shall be recorded on oscillograph. All data recorded on oscillograph shall be properly labeled and identified.
4. All equipment, including the substation enclosure, shall be inspected for damage, including loose bolts, after each short-circuit test. Failure of any item of equipment to withstand these fault tests or to coordinate or meet specified requirements shall be reason for rejection of the equipment.

5. All monitoring equipment, correct application for this equipment andadjustment of devices shall be the responsibility of the Contractor. King County will furnish electrical workers to make incidental connections and supply miscellaneous non-specialized equipment.

D. SCADA:

The Contractor may be required to perform tests on the RTU via telephone lines provided by others to King County Control Center and demonstrate that all the discrete and analog inputs from the substation function properly and to demonstrate that all the control outputs from King County Control Center function properly.

END OF SECTION